A CHILTON PUBLICATION

The Iron Age

THE NATIONAL METALWORKING WEEKLY

July 10, 1952

CONTENTS PAGE 2

U. OF MICHIGAN
JUL 11 1952
ENGINEERING
LIBRARY

Theories proved or exploded here

• Before you place a new design on the market, it is important that you know how it will work under operating conditions.

Where the design involves the use of anti-friction bearings, New Departure's new, ultra modern testing laboratory can determine *in advance* what performance you can expect "in the field".

Furthermore, as the study progresses, New Departure engineers may find it possible to improve the performance or the assurance of success by applying their ingenuity and their fund of knowledge and over forty years experience to the subject at hand.

May we work with you on your anti-friction problems?

NEW DEPARTURE • Division of GENERAL MOTORS CORPORATION • BRISTOL, CONNECTICUT • BRANCHES IN ALL PRINCIPAL CITIES 169-PC

Williams' Titan Crusher served by custom-built Farval centralized system

THE lubrication problem was this: How to keep the rotating spindle bearings on the novel crusher (at right) working dependably and efficiently in an important ore preparation plant.

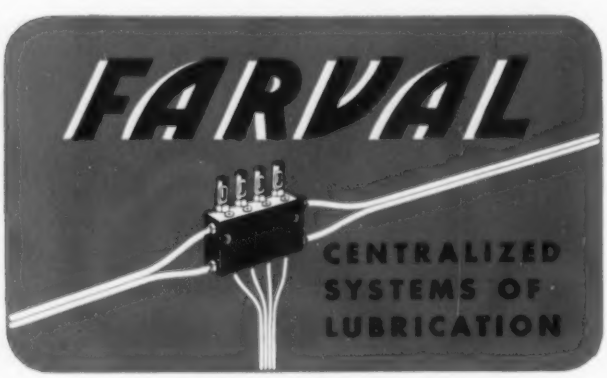
The plant engineers knew that pulverizing and crushing stubborn flint-like ore creates tremendous bearing pressures and that meant that constant lubrication care was a must. They also knew that getting a lubrication system onto a rotating portion of a machine had always presented a ticklish problem. Yet, to stop the machine for guess-and-by-gosh hand oiling meant production hours wasted and, at best, a hit-or-miss lubrication job.

To cope with the special problems presented by this ore crusher, Farval engineers were called in and soon came up with a modern custom-built solution for lubricating constantly moving bearings. In a unique rotating connection and by means of tough, flexible hoses and a reversing element, the Farval Centralized Lubrication System was tailored to body-fit the gyrating portions of the crusher. This practical approach to machine preventive maintenance saves time and men, saves lubrication (as high as 75%) and most important, increases production.

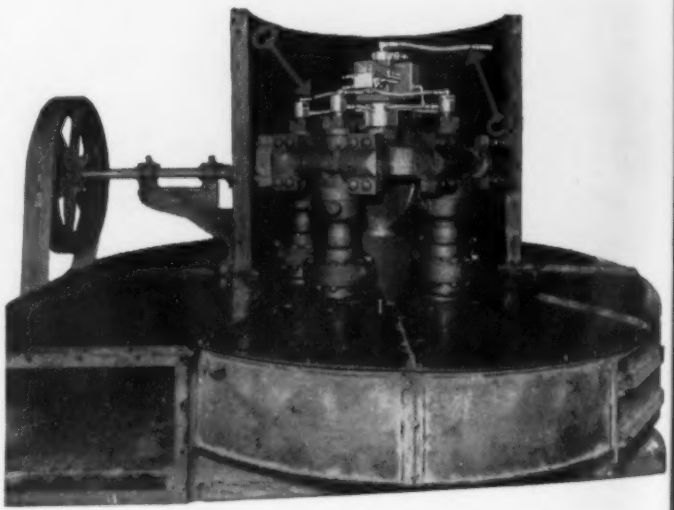
Farval has proven itself in 25 years of service to industry. It is the original Dualine system of centralized lubrication. The Farval valve has only two moving parts —is simple, sure and foolproof, without springs, ball-checks or pinhole ports to cause trouble. Through its wide valve ports and full hydraulic operation, Farval unfailingly delivers grease or oil to each bearing—as much as you want—as often as desired. Indicators at every bearing show that each valve has functioned.

In or near your city, there is a Farval engineer ready to serve you with your special or conventional lubrication problems. Write now for Bulletin 25 and a full description of the Farval system at work. The Farval Corporation, 3252 E. 80th St., Cleveland 4, Ohio.

Affiliate of The Cleveland Worm and Gear Company, Industrial Worm Gearing. In Canada: Peacock Bros. Ltd.



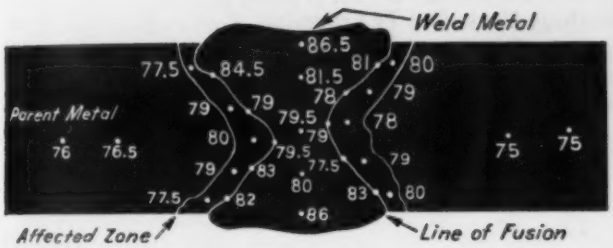
FARVAL—*Studies in Centralized Lubrication* No. 135



KEYS TO ADEQUATE LUBRICATION—*Whenever you see the sign of Farval—the familiar valve manifolds, dual lubricant lines and central pumping station—you know a machine is being properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.*

Illustration by courtesy of Williams Patent Crusher and Pulverizer Co.

This Low-Alloy High-Strength Steel Welds as Readily as Carbon Grades



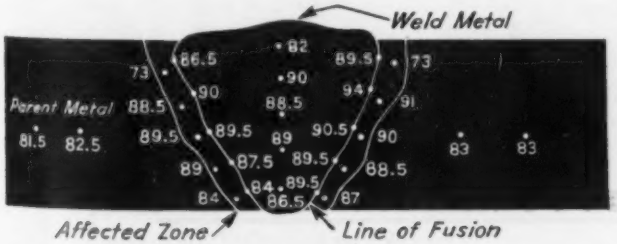
Rockwell B hardness on ½-in. manual arc-welded plate of Mayari R, stress-relieved at 1050 deg F.

Mayari R is a low-alloy, high-strength steel that can be welded by the ordinary methods used for plain carbon steel . . . electric-resistance, including spot-, seam-, and flash-butt . . . electric-arc, including metallic, carbon, and inert-arc . . . automatic-submerged-arc . . . and gas-welding processes.

There is no difference in the equipment, the technique, or the welding speed with Mayari R.

A non-air-hardening grade, Mayari R shows no appreciable hardening from welding temperatures. Results of tests made on welded Mayari R indicate that the welds are equally as strong as the parent metal.

Full information on welding and fabricating this steel is readily available for your files. Write or phone any Bethlehem sales office and ask for a copy of Mayari R Catalog 259.



Rockwell B hardness on ¼-in. manual arc-welded Mayari R plate, as welded.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

Mayari R *makes it lighter... stronger... longer lasting*

IRON AGE

JULY 10, 1952
VOL. 170, No. 2

THE IRON AGE

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Circulation Representatives: Thomas Scott, James Richardson.

One of the Publications Owned and Published by Chilton Co., Inc., Chestnut & 56th Sts., Philadelphia 39, Pa.

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Indexed in the Industrial Arts Index and the Engineering Index. Published every Thursday by the CHILTON CO. (INC.), Chestnut & 56th Sts., Philadelphia 39, Pa. Entered as second class matter, Nov. 8, 1932, at the Post Office at Philadelphia under the act of March 3, 1879. $8 yearly in United States, its territories and Canada; other Western Hemisphere Countries, $15; other Foreign Countries, $25 per year. Single Copies 35c. Annual Review and Metal Industry Facts Issue, $2.00. Cable address "Ironage" N. Y.

Audit Bureau of Circulations

Society of Business Magazine Editors

Controlled Circulation Audit

National Business Publications

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DIGEST

of the week in metalworking

STRIKE CAUSING DANGEROUS ORE SHORTAGE

PAGE 89

The Great Lakes iron ore fleet was anchored because of the steel strike. Steel men feared this idleness will cripple blast furnace production next spring because of ore shortages now sure to develop. Each strike day sees 200,000 tons of ore lost to stockpiles. Ore losses today are staggering.

WHAT'S BEHIND WESTINGHOUSE STRIKE?

PAGE 90

Employees of Westinghouse's Nuttall Works have been heeding arguments mustered by the company condemning a strike that had shut down a vital defense plant. A back-to-work movement has developed but workers found no place to meet. Company pinned a Red label on the strike.

PUSH-BUTTON INVENTORY WITH ELECTRONICS

PAGE 92

The new Magnetronic Reservisor is providing split-second inventory information for American Airlines. It is now used to make reservations for the air line, yielding facts on seating space available on more than 1000 flights. The "brain" can be used by some businesses needing quick figures.

STEEL WAREHOUSE STOCKS DISAPPEARING

PAGE 93

Warehouse stocks of steel were fading away as effects of the strike took hold. Inventory holes were appearing in nearly all lines and popular sizes in many lines were wiped out. Oddly enough, demand is good but not sensational. Scare buying is held down. What's happening in warehouse centers.

"GENERATOR" LOOKS GOOD FOR ALUMINUM

PAGE 94

Coal firm, trying to boost its product, comes up with a way to convert coal directly to electricity. Still in the experimental stage, the unit promises almost fantastic efficiency. Backers of the Kilgore plan for a West Virginia aluminum plant are counting on it. Plant could exist by '57.

AUTOMOTIVE WORKERS START LONG HOLIDAY

PAGE 108

Fourth of July holiday will be stretched out for more than 100,000 workers as plants run out of steel. Some firms are closed down tight now, with others operating on a day-to-day basis. Paralysis started in parts plants, has now caught up with assembly lines which ran while parts lasted.

WASHINGTON OFFERS $4.50 STEEL BOOST

PAGE 113

Dr. John R. Steelman, Presidential assistant, has offered the steel industry a price rise of $4.50 a ton, reliable sources report. Some quarters are betting that the final increase will top that figure by a dollar. OPS chief Ellis Arnall's statements to the contrary are seen as just talk.

BEARING COMPONENTS IN TIGHT DESIGNS

PAGE 131

Despite the wide range of orthodox ball and roller bearing units on the market there are times when space or other factors don't permit use of a complete bearing in a machine design. A number of applications developed use either the bore or shaft as the outer or inner bearing race.

HIGHLY ALLOYED STAINLESS ACID RESISTANT

PAGE 135

Stainless steels highly alloyed with copper, molybdenum, nickel and chromium show excellent corrosion resistance to sulfuric acid. These alloys can be welded. But presence of sigma and Cu-rich phases may reduce corrosion resistance in some cases. Annealing at 1900° to 2100°F is needed.

SPECIAL FIXTURES SPEED SHEETMETAL WORK

PAGE 142

Fabrication of laundry equipment at Whirlpool Corp. is speeded by cleverly designed fixtures for projection welding. Work is done with maximum economy, minimum labor. Some jobs involve unusual features. Most are standard resistance welding machines. One is a special expansion gun welder.

STEEL CONSUMERS CAUGHT IN THE MIDDLE

171 PAGE

This week the steel strike is immobilizing huge areas of the nation's manufacturing strength. Caught in the middle is the poor steel consumer who wonders why he should suffer such staggering losses. Many recall that WSB got union shop authority only after labor members took a walk for a time.

END-QUENCH-HARDNESS PREDICTION EASIER

NEXT WEEK

A faster, better method has been developed for estimating a Jominy curve from the first 1/16 in. to the region of 50 pct martensite if both carbon content and D_I are known. Accuracy is reasonably good if the two basic factors are reliable. Method is not too accurate on boron steels.

Only B. F. Goodrich makes the grommet belts that cut costs 20 to 50%!

Save 3 ways! Investigate today! Write or mail coupon

You save belt costs because belts last longer, save production costs because machines keep running with fewer interruptions, save maintenance costs because they need less attention.

Patented grommet belts by B. F. Goodrich represent the only basic change since invention of the V belt. Belts last 20 to 50 per cent longer, depending on service. (The more severe the service, the greater the increase over ordinary belts.) Grommet belts have more rubber; they're more flexible, give better grip, less slip.

What is a grommet?

A grommet is like a giant cable except that it's *endless*—a cord loop built up by winding heavy cord on itself. There is no overlapping cord *section* as in all ordinary belts. Most belt failures occur in these sections where cords overlap!

All cords put to work

Each of the two grommets and every part of a grommet carry their share of the load. In ordinary belts under high tension the center cords "dish" because tension is greater near the driving faces. Dished cords are doing less work, not pulling their share. Grommet belts have no center cords, there is no dishing—therefore much more strength in proportion to cord volume—and less stretch. Grommet belts stretch, on an average, only about one-third as much as ordinary belts.

Better grip, less slip

Grommet belts have more rubber in relation to belt size. Without any stiff overlap, they're more flexible, grip pulleys better. Size for size, grommet belts give ⅓ more gripping power, pull heavier loads with a higher safety factor. Because there is less slip, there is also less surface wear.

Send for proof

Send the coupon for a set of reports telling users' experiences and showing actual installations where grommet belts outlasted all others. Some typical cases:

"... within a few days ordinary belts had stretched ... After six months of 24-hour-a-day service BFG grommet belts haven't stretched at all ..."

"Ordinary belts lasted only 5 or 6 weeks ... B. F. Goodrich grommet belts are in their sixth month of service ..."

"Previous belts suffered from shock loads, wore out fast ... BFG grommet belts have been in service 2 years with no shut-downs..."

There are hundreds of cases like these.

They cost no more

BFG grommet belts cost not one cent more than others. The savings they make for you are clear profit. They are made in C, D and E sections. They are patented by B. F. Goodrich. No other V belt is a grommet belt (U. S. Patent No. 2,233,294).

Write, send the coupon or see your B. F. Goodrich distributor. (He will show you his "X-ray" belt that shows the grommet construction clearly.)

Grommet V Belts BY

B.F.Goodrich

FIRST IN RUBBER

The B. F. Goodrich Company
Dept. IA-7
Akron, Ohio

☐ Send set of reports telling users' experiences and showing actual installations proving that B. F. Goodrich grommet belts outlast all others.

☐ Have distributor show me the "X-ray" belt that shows how B. F. Goodrich grommet belts are made.

Name_____

Firm Name_____

_____

Street Address_____

City_____

State_____

The Iron Age
FOUNDED 1855

Facts and Eyewash

WE USED to know a fellow who often said, "Don't confuse me with the facts." He brought this up when a little grey matter was needed to look into a tough problem.

Neither Harry Truman nor his assistant, Dr. John Steelman, want to be bothered with the facts in the steel case. Both know them because Dr. Steelman has been fully informed. But both are unalterably in the labor camp.

Anti-steel company statements from Harry Truman have been more vitriolic and less informed than those from Mr. Murray, Steel Workers Union head, and many of Mr. Murray's have taken the breath away from those who were familiar with all angles of the steel case.

The steel industry has been licked by the union on every major point except the union shop. With the help of a "packed" WSB, a friendly Administration and the power of the strike, the union forced steel firms to offer a 16¢ an hr raise and 5½¢ an hr fringe benefits.

Steel firms knew when they offered this package to the union that they would not be allowed a price increase to cover the full direct cost. They knew the indirect cost would have to be absorbed by stockholders—and taxpayers. They were against any wage or price rise.

The strike was called by the union for the single purpose of forcing the union shop on the steel industry. The "Big Six" whom Mr. Murray was happy to bargain with have stuck together against pressure from Truman and Murray on the union shop issue.

Harry Truman says some steel firms are using pressure to keep many other firms from signing a contract with the union shop. That's eyewash of the weakest kind. Either Truman has been ill informed or he is ignorant of the facts—or he is playing politics.

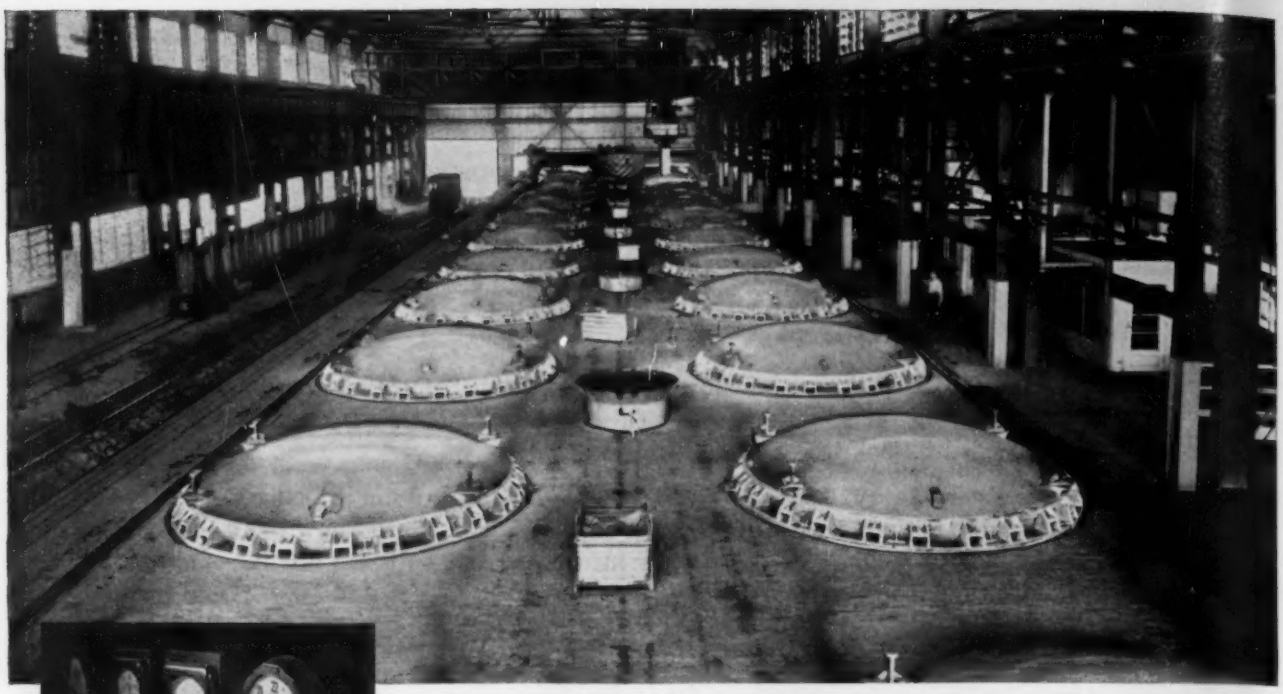
Dr. Steelman professes not to know what the "roadblock to settlement" is. That is unadulterated bilge. He knows precisely why the strike was called. He was present when steel firms balked on the union shop issue so he knows why there is no settlement.

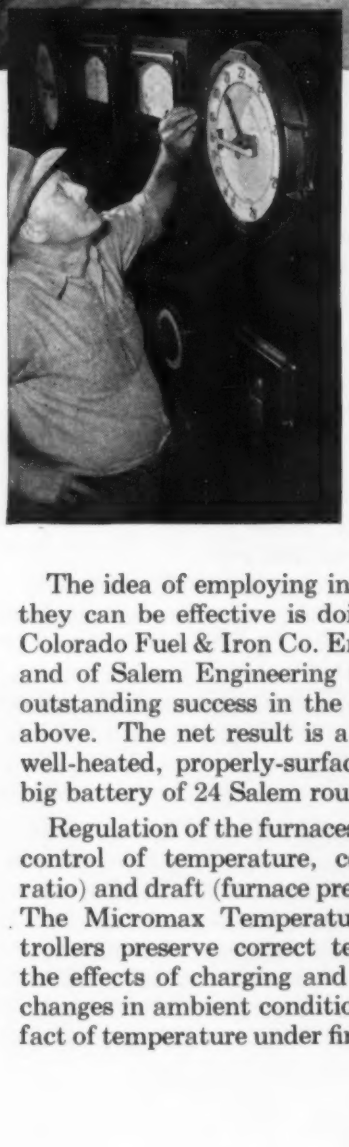
Mr. Murray knows that if he can't break one or two of the "Big Six" he can't get the union shop. He knows it is the only issue because he agreed to settle on all the other points.

Eyewash and bilge are poor substitutes for facts.

Tom Campbell

Editor





◂ Partial view of one of the control panels for C.F. & I. soaking pits. Heater is opening Micromax Controller case to change temperature control point.

▴ Part of C.F. & I.'s battery of 24 Salem soaking pit furnaces in Pueblo, Colo. plant. Control panels are in cubicles in right hand bay.

How C. F. & I. controls pit furnaces to give ingots

correct TEMPERATURE *and* SURFACE

The idea of employing instruments wherever they can be effective is doing a major job for Colorado Fuel & Iron Co. Engineers of C.F. & I. and of Salem Engineering Co. applied it with outstanding success in the soaking pits shown above. The net result is a plentiful supply of well-heated, properly-surfaced ingots from the big battery of 24 Salem round pit furnaces.

Regulation of the furnaces includes automatic control of temperature, combustion (fuel-air ratio) and draft (furnace pressure) in that order. The Micromax Temperature Recording Controllers preserve correct temperatures despite the effects of charging and pulling ingots, and changes in ambient conditions. With this basic fact of temperature under firm control, the other instruments can hold the equally important combustion factors at their correct respective settings. Furnace atmosphere can be made either neutral, oxidizing or reducing at any operating temperature. Draft can be made to hold the products of combustion to their proper path through the furnace for any operating load of ingots.

The L&N line today includes instruments, controllers and accessories in far greater variety than ever before. From among these standard equipments we can help you assemble control panels that are tailored exactly to the needs of any pit furnace . . . or any other industrial furnace. Just contact our nearest office or write us at 4956 Stenton Ave., Phila. 44, Penna.

LEEDS instruments NORTHRUP automatic controls • furnaces

Jrl Ad N-33-667(2a)

Dear Editor:

Letters from readers

Hot Radiography

Sir:

An article on a new method of "hot radiography" which permits taking X-ray photographs of large pipes, valves and similar units at temperatures as high as 1200°F appeared in your June 12 issue.

We are very much interested in this application and would greatly appreciate it if you could tell us whom we can contact to obtain more information.

H. H. GORRIE
Asst. Chief Engineer
Bailey Meter Co.
Cleveland

For more information on hot radiography contact Sam Tour & Co., Inc., 44 Trinity Place, New York.—Ed.

Going Abroad

Sir:

The department believes that your article "Job Foundry Tackles Shell Mold Production" in your May 15 issue will be useful to the government's overseas information program. It therefore asks your permission to reprint and distribute this article, through its information officers abroad, to foreign magazines or newspapers in continental Europe, Latin America, the Middle East, the Far East, Africa and the French-language press in Canada for republication.

C. McCOMBER
Dept. of State
Copyright Clearance Unit
International Press Service
Washington

Savings Technique

Sir:

On p. 69 of the June 12 issue is an item which reads, in part, as follows:

"Substantial savings in tooling expense are possible through use of scale models or even full size plastic prototypes of manufactured products. . ."

We would appreciate being advised from what source further information on this subject could be obtained.

L. V. JOHNSON
Chief Engineer
National Tube Div.
U. S. Steel Co.
Pittsburgh

Write to Creative Industries of Detroit, 3080 E. Outer Drive, Detroit, for more details on the use of plastic prototypes of manufactured products.—Ed.

Plastic Conductor

Sir:

On p. 53 of the June 26 issue you described an electrically conductive plastic material applied to metal parts that will heat up to 400° F.

Can you give us the name and address of the maker?

C. C. COHN
Colonial Stove Co.
Philadelphia

The manufacturer of the electrically conductive plastic material is the Electrofilm Corp., 7166 Laurel Canyon Blvd., North Hollywood, Calif.—Ed.

CO_2 Coolant

Sir:

Referring to the item on the Newsfront page of your June 26 issue on the use of carbon dioxide as a coolant, we would be glad to have further engineering and technical data on this subject.

W. W. McKAIG
Cumberland Steel Co.
Cumberland, Md.

Further information may be obtained from the National Cash Register Co., Dayton.—Ed.

Automaticity

Sir:

Your article "Automatic Forging Presses Feature New Shell Line" by John A. Verson and Henry Irwin, in the May 22 issue, is so interesting and complete that I would greatly appreciate receiving four copies of same.

A. P. GOCKEL
A. P. Gockel Machinery Co.
Cleveland

Shell Molding

Sir:

We refer to your article "Shell Molded Stainless Valves and Fittings Now In Production" appearing in the June 26 issue. Can you tell us where to purchase World-Bestos binding tape?

S. MILLER
Vice-President
Brisk Foundry & Machine Co.
Imlay City, Mich.

World-Bestos binding tape can be purchased from the World-Bestos Corp., 109 West 64th St., New York.—Ed.

Power Transmission

Sir:

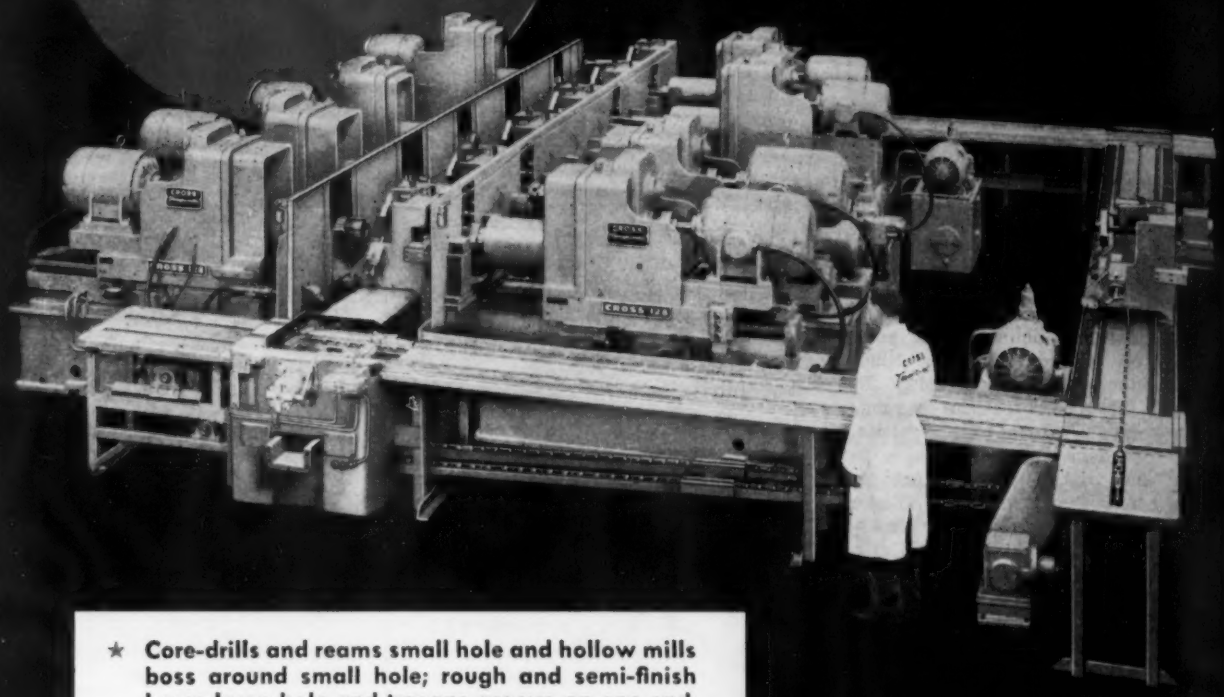
Your series of articles entitled "Power Transmission Through Flexible Couplings" starting in your Jan. 10 issue, are of great interest to our laboratory. We would appreciate receiving a reprint of them.

D. W. VAN KREVELEN
Director of Research
Staatsmijnen In Limburg
Central Laboratory
Geleen, Netherlands

PRECISION MADE
Pheoll
SCREWS, BOLTS, NUTS and SPECIAL FASTENERS
save assembly time
improve product strength
and final appearance
ACCURATE THREADING SAVES TIME
Pheoll Screws, Bolts, and Nuts are easier to start, easier to drive and easier to tighten—because they're accurately machined and threaded. These features cut your assembly time and cost.
COLD ROLLED THREADS GIVE STRENGTH
The grain structure and flow of metal obtained through cold heading and roll threading increases the structural strength of Pheoll Fasteners. Cold working improves thread bearing surfaces, providing greater area of contact for firmer grip. Greater strength reduces possibility of shearing, and time lost in subsequent removal and retapping.
OUR INSPECTION IMPROVES YOUR PRODUCT APPEARANCE
Step by step Pheoll inspection, through every process of production, assures uniform head size and shape; cleanly milled and recessed heads, neat chamfering and countersinking. All these factors contribute to the quality and finish which add materially to your product's final appearance. Write for Pheoll's product literature and price list.
THESE PHEOLL PRODUCTS INCREASE YOUR PRODUCTION RATE. Thumb Screws Machine Screws† • Wood Screws† • Sheet Metal Screws† • Stove Bolts† • Rolled Threaded Wires and Studs • Special Rivets and Pins • Brass Washers
†Furnished in slotted and Phillips Recessed Head Types
Pheoll
MANUFACTURING COMPANY
5700 ROOSEVELT ROAD
CHICAGO 50, ILLINOIS
SCREWS • BOLTS • NUTS

Bores, Hollow Mills and Trepans Tank Idler Arms

Another Transfer-matic by Cross



- ★ Core-drills and reams small hole and hollow mills boss around small hole; rough and semi-finish bores large hole and trepans groove on one end.
- ★ Cast Armor material—Rockwell C-36.
- ★ Six and one-half pieces per hour at 100% efficiency.
- ★ Six stations—one for loading, five for machining —with automatic transfer from station to station.
- ★ Palletized work holding fixtures hold part securely for all operations with integral conveyor returning fixtures from last station to loading station.
- ★ J.I.C. standard electrical and hydraulic construction with stranded wire.
- ★ Pre-set tools and Cross Cutter-Drive reduces downtime.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Fatigue Cracks

by Charles T. Post

Tops

It will come as no surprise to the readers to learn that your f.f.j. walked away with first prize for the best series of articles to be published in any industrial publication during 1951. The prize was awarded in Chicago last week by *Industrial Marketing* magazine at the annual meeting of the National Industrial Advertisers Association.

The series that took the judges' eye was Technical Editor D. I. Brown's comprehensive treatment of "Boron Steels—A New Era in Alloy Metallurgy." The articles, it turned out, were just as hot as the weather last July and August when they appeared.

Nothing as complete or authoritative had appeared in print on this subject previously, and reader response was i m m e d i a t e and heavy. So indelibly did Editor Brown become associated with the new steels that one correspondent let his subconscious take command and addressed a request for further information to D. I. Boron.

Lobby Lure

A large part of a salesman's life, we understand, is spent waiting in office lobbies to see somebody or other about something. The most popular plants are those which have the best selection of reading material. Occasionally a visiting salesman is carried away with a magazine and the magazine is carried away by the salesman.

Peirce Lewis, your f.f.j.'s energetic regional business manager, reports that the Lima Electric Motor Co., Lima, Ohio, has solved the problem effectively. The current copy of Esquire is fastened to a brass chain anchored to the leg of a davenport in the lobby.

Punch

Next time the conductor punches your ticket, please catch the tiny scrap that drops out and mail it to Lucille Jackson, chemistry library, Pennsylvania State College, State College, Pa.

When Editor Brown, in search of further prize-winning articles, dropped in on Miss Jackson a few weeks ago, he quickly pried loose the information that she is an avid collector of ticket punches. It was news to us, but Brown learned that each individual conductor has a punch with a distinctive pattern which is as much a part of him as his fingerprints. Presumably if you get thrown off the train at the wrong stop, you can take your ticket to the railroad and the culprit who punched your ticket can be identified and called on the carpet.

Plaisir du Roi

Foreign readers of your f.f.j. necessarily receive their copies somewhat later than the local subscribers. This is particularly irritating to them because it prevents their submitting answers to Fatigue Cracks puzzlers while the heat of competition still is incandescent. Some readers, like J. Tannery of Paris make a special effort to overcome this handicap. With his sketch showing the solution to the king's orchard problem, which appeared some weeks back, Monsieur Tannery poured out his soul:

"J'aurais voulu répondre
Par un Quatrain galant
Aux vers si poétiques
Exposant la question.
Mais ma muse hypocondre
A reculé devant
Les traits géométriques
Donnant la solution.

C'est seule, une figure
Faite d'une main peu sûre
Qui sera mon envoi,
Pour le Plaisir du Roi.

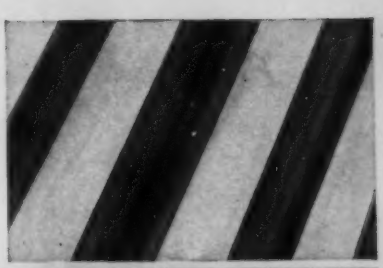
Puzzlers

The cow in last week's Puzzler had 34,227.1182 sq ft in which to graze. Perhaps some of you amateur farmers can tell us how long it would take a cow to remove all the grass from a field of this size.

Despite the heat, we have had many answers to the Bumble Bee Problem. So far we have heard from:

C. B. Smith, Portland Copper & Tank Works; M. W. Hubbard, Mid-States Mfg. Corp., Inc.; S. Grubman, State Metals & Steel Co., Inc.; R. W. Huff, Canton, Ohio; L. E. Cooper, American Steel Suppliers, Inc.; A. B. Retallick, Mount Vernon, N. Y.; J. C. DeVol. Battle Creek Bread Wrapping Machine Co.; H. K. Moore, Eaton & Howard; M. M. Popernik, Meter Devices Co.; L. J. Bosstick, Clark Equip. Co.; T. L. Moore, Haverford, Pa.; R. Cutler, Powdered Metal Products Corp.

It is too hot for us to figure out a puzzler, so take a short vacation.



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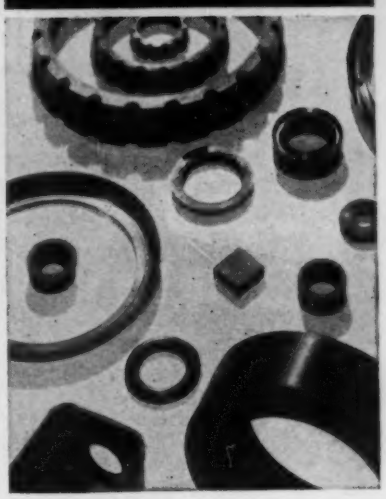

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● *Photo—Courtesy Aerojet—Division of The General Tire & Rubber Co.*

Working on rocket motors at Aerojet—Division of The General Tire & Rubber Company, this versatile 4′ 9″ column Cincinnati Bickford Super Service Radial is economically drilling and tapping in type 347 stainless steel.

Class 3 fit is required on the tapping operations of these ½″ x 20″ and 7/16″ x 24″ holes.

In this unusual installation a 12-foot pit permits processing of large work in vertical position, while another piece is set up on large V-block fixtures on plain box table.

The centralized controls clear view Bickford Head, and wide selection of speeds and feeds all bring ease and economy on this job.

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the Iron Age
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THE IRON AGE Newsfront

► Strike damage of steel openhearth and blast furnaces is heavier than expected. In some quarters, cave-in of openhearth roofs has been as high as 25 pct--may be 30 pct before strike's end. Life of blast furnace lining is the same under banking as under operation.

► Possibility of a steel industry shutdown because of iron ore shortages now looms as a genuine threat. Shipments that should be at peak are now at zero while the navigation season on the Great Lakes flits away because of the strike. At the rate new steel capacity will come in this fall there is little chance it will be completely operating next March when ore supply ebbs. Winter railroad hauling may not be the complete answer to forestalling shortage.

► Many manufacturing plants which will shut down for vacation are telling suppliers to keep shipping material. For the past few years manufacturers shut down everything during vacation and took a chance of catching up when employees returned. Now, there seems to be a picking up in demand for some civilian goods. Add this to a possible steel shortage and it means a push to gather up inventory.

► In warehouses even slow-moving steel items are going like hotcakes and another week should see scraping the bottom of the barrel. Many manufacturers have managed to stay open only because of warehouse buying. Many plants are staggering output because inventory is unbalanced. Some would like to shut down but keep operating at even 2 or 3 days a week to satisfy demands for finished products.

► Total steelmaking loss due to strike may well top 15 million tons before operations resume. This is equivalent to the industry operating at below 90 pct of capacity for 1952. Lower operating rates for steelmaking anticipated in the final quarter are now impossible. Lifespan of controls is also extended by the steel loss.

► Aluminum strip may find wide use as sheathing for telephone cable. Now under test, cable and strip are fed simultaneously into a tube mill at final forming role. When strip closes around cable it's induction welded. Advantages claimed are cost, lighter cable.

► Nickel-thrifty bearing makers have tested a few heats of 94B20 steel as a substitute for such nickel alloys as 4720.

► Under development is threading equipment to match speed of a new screw slotter which can slot more than 2200 screws per min.

► Time-saving is feature of a new quick closing door for vulcanizing, chemical industries using pressure vessels. Four years in development, the door can be closed hydraulically in 20 sec, manually in 1 to 2 min. Old type door took 20 min to close.

► TVA regulations limiting bidding for cable contracts to firms with 500 and less workers shut the door on Aluminum Co. of America, one of TVA's largest civilian power customers. TVA can bid only on cable which is not made by the smaller producers.

► West Coast mortar shell producers worry about lack of a rugged trimmer. Trimmers on the market built for brass cartridge cases haven't been redesigned for steel. Maintenance time, not including down time, was 122 hr per month on one unit--at $2.20 per hr.

► Ordnance is making rotating bands by welding heads of ingot iron on some artillery shells. Weld is simply machined with a form tool to band contour, size. Sometimes this beats iron powder bands.

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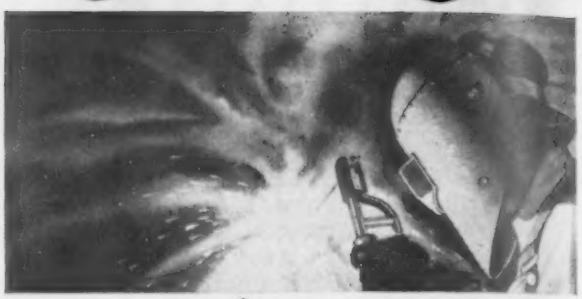

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IRON ORE: Shortage Is Strike Byproduct

Steel men fear ore shortage will cripple blast furnace output next spring . . . About 15 million tons of ore lost so far . . . More demand with new furnaces—*By E. C. Beaudet.*

As the boats of the Great Lakes ore fleet swung idly at anchor last week, steel producers were fearing ore shortages certain to cripple production at the nation's blast furnaces this spring. The possibility of an ore shortage seemed rather remote when the strike started over a month ago. But no one thought the strike would last this long.

That remote possibility has crystallized into a harsh reality. Each day the mines are shut down 200,000 tons of ore are being lost to the winter stockpile. During the last week in June, not one pound of ore left U. S. upper Lake ports.

Close to 15 million tons of iron ore have already been lost to the strike. As of July 1 Lake shipments totaled 21,516,014 tons, thus running 10,535,595 tons behind last year's shipments. From January to June, rail shipments came to 1,232,466 tons, a drop of 1,536,534 tons behind the same period last year. These lost tonnages, now reaching alarming proportions, will be increased by over 3 million tons a week as long as the strike lasts.

"If we are in the midst of a shooting war next winter, this ore loss would be hazardous, and if the strike continues the loss could be disastrous," according to Charles M. White, president, Republic Steel Corp. Mr. White believes we should be mining ore on the same basis that steel is being supplied from struck mills for the war effort, shipping and stocking it at various blast furnace plants in the country during the summer months.

At present about 7 million tons of ore are now stockpiled at upper Lake ports. Some quarters believe this should be shipped immediately to help alleviate the tight squeeze next spring.

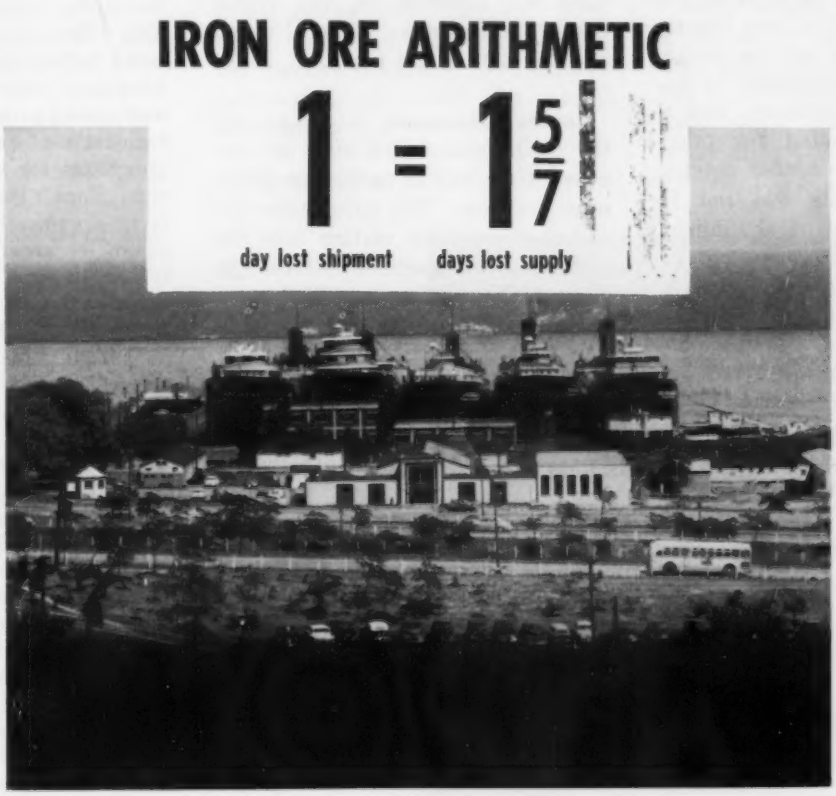
Once the strike is over ore fleets will be hard-pressed to meet the demands of blast furnaces. Blast furnace operations continuing during the strike have eaten heavily into existing stockpiles. Furthermore, the steel strike has lit new fires under steel demand which was expected to soften by the end of the year.

Some steel executives now think the strike will put pressure on all steel products during the first quarter of 1953. Completion of new blast furnaces will also increase ore needs.

Just how effective the use of Canadian ships and all-rail shipments during the winter will be in warding off blast furnace shut-downs depends upon how long the strike lasts. Reliable sources point out that Canadian ships last year accounted for only 500,000 tons from U. S. mines. It is not very impressive when 3 million tons are being lost per week.

All-rail shipments, in addition to being costly, could not make up the shortage if the strike lasts. Already 50 pct behind last year's movement at the start of the strike, they could not be expected to equal last year's record movement of 7,918,798 tons. Thawing out frozen ore in freight cars during winter months is another headache in using all-rail shipments. Stepped-up efforts to ship by rail would tie up thousands of cars badly needed for transportation of goods.

Each day of strike costs five-sevenths of a day blast furnace production next winter.



STRIKE: Who's Behind This One?

Westinghouse charges Nuttall Works strike is communist inspired . . . Many workers agree, form Back to Work Committee . . . Union leaders fight return to work—*By J. B. Delaney.*

Many employees of Nuttall Works, Westinghouse Electric Corp., Pittsburgh, privately damned the strike that had shut down a vital defense plant since Apr. 15. But resistance was mostly verbal. Issues of the dispute were trivial. They even disappeared—but still the union high command stubbornly refused to relinquish the strike.

Meanwhile, Westinghouse was mustering all its logic and pounding it home in the form of letters to the workers. The firm bluntly pinned a Red label on the strike, posing important questions: Is this strike communist-influenced and is it the proving ground for other strikes calculated to hinder defense production? If this was not so what was the sense of shutdown?

Logic Tells—Were the workers reading the memos circulated by Westinghouse? It's plain they were. Employee letters complaining about the strike reached Westinghouse. Local papers carried letters signifying disgust at union leadership. But last week resistance came out boldly into the open—and flopped badly.

A back-to-work movement seemed to be developing. Employees received a mimeographed letter from the Back to Work Committee, Nuttall 601 Employees. The letter announced a meeting for last Sunday afternoon. In part the letter said:

"We think it is time to quit stalling. What's the sense of us sitting around, losing our pay every week when there's nothing to strike about. We think that's the way you feel about it. Nobody is going to get this thing on the right track but us. The union leaders won't get anywhere because nobody believes them anymore."

But the union barred the men from meeting in the union hall. When the workers tried to hold an open air meeting on the street corner, police broke it up. No one had thought to get a permit.

Issues Disappear — Originally the strike was called over 26 disputed time values involving about nine workers. The union later injected a seniority matter into the dispute and then withdrew it, claims Westinghouse. With removal of Navy work, the company now says that even the time value issue has disappeared. The union has meanwhile shifted its attack, claiming its grievance on time values is now plant wide.

Nationally, the strike has not caused a ripple. But it has deprived America's defense effort of crucially-needed parts for jet engines, minesweepers, sub-radar. It's not a big strike. Only 475 workers out of 650 are involved. But as Westinghouse repeated to its employees there may be more momentous, perhaps sinister, aspects in a senseless strike which does not yield to negotiation.

In a letter to employees, the company pointedly asked: "Could it be that these (union) leaders are using Nuttall as a 'proving ground' to see how a handful of men can tie up a plant making defense equipment?" About 70 pct of Nuttall orders were for defense.

UEW after being kicked out of the CIO in 1949 on charges it was Red-dominated managed to hold power over Nuttall Works.

Westinghouse Reports — As the strike progressed Westinghouse began to war with words. Chief argument was that the strike was communist-influenced. Here is a sample of what Nuttall employees have been reading which has contributed to their disgruntlement (from letters of H. R. Botsai, division manager):

"A look at the records of these leaders should give you the answer. Remember, not one of these men works at Nuttall. Not one of them has lost a day's pay because of this strike.

"Stanley Loney—I've already told you he was named by Matt Cvetic, in sworn testimony before a congressional committee, as being active in communist work in the Pittsburgh area. According to further testimony before the Committee on Un-American Activities, Stanley Loney was named as a delegate to the 1947 national conference of the American Committee for Protection of the Foreign Born, the oldest communist-front organization in the U. S., and one of the organizations listed by Attorney General Clark as subversive. Loney was a member of the nominating committee at this conference.

"Tommy Flanagan—He was secretary of the Pittsburgh Chapter of the American Peace Crusade, which was named by the House Un-American Activities Committee as 'an organic part of the Communist peace offensive.' Flanagan was also a delegate to the 1947 national conference of the American Committee for Protection of the Foreign Born, and was a member of the resolution committee of that conference.

"Richard Niebur—Two years ago, Victor Decavitch, in sworn testimony before the House Un-American Activities Committee, named Niebur as a Communist Party member."

Forever Lost—Regarding withdrawal of Navy work, the company says as far as it knows the work is gone forever—"Most of it has gone to our competitors, who certainly will not send it back to us." The company compared tactics of union leaders with those of the "Chinese communists in the Korean peace talks at Panmunjom."

Workers Take Ball—One worker in a letter to a Pittsburgh newspaper, had this to say:

"My own personal opinion is the union is not even trying to get us back to work, because we have had only two meetings in all this time and we have not even been allowed to vote on whether the members want to return to work."

WSB: Authority Curbed Too Late

Board should never have ruled on union shop issue . . . Won authority over such issues after union took a walk . . . Labor may walk out again . . . Ask price rises—*By J. B. Delaney.*

The Wage Stabilization Board's recommendation of a union shop for the United Steelworkers of America (CIO) was largely to blame for the industry-wide steel strike.

It is generally agreed that had the union shop not been an issue the dispute between the steel industry and the union could have been settled without a strike.

Ironically, more than 3 months too late, Congress has taken away from WSB the authority to make recommendations on non-economic issues, such as the union shop. The board now is forbidden to handle disputes except in a limited way.

Clipped Its Wings—In fact, congress has so clipped the wings of WSB that organized labor may refuse to serve on the board. Labor took a similar "walk" early last year, forcing President Truman to give WSB authority to rule in dispute cases. The steel recommendation followed.

Early this week—sixth of the strike—there was no sign of an early break through collective bargaining.

The steel producers reaffirm their determination to hold out against the union shop in any form. The union's drive to sign small companies to interim agreements pending final outcome of the dispute has been slowed to a snail's pace. Its divide-and-conquer tactics apparently have failed for the moment. Largest producer to sign up was Pittsburgh Steel Co. The solid front of the six biggest companies is unbroken.

In a desperate effort to force a resumption of collective bargaining the union has filed charges of unfair labor practices against the steel producers. The union accused the companies of refusal to bargain a charge promptly branded by the steel producers as "ridiculous." The National Labor Relations Board is investigating the charges. Normally, the board attempts to bring the parties together in collective bargaining to avoid extensive hearings.

Price Bids—On the steel price front, Pittsburgh Steel Co. on June 30 put into effect a 2.6 pct increase—an average of $2.84 per ton—under the Capehart Amendment, which takes into account cost increases from start of the Korean War to last July 26. It has also asked for permission to advance prices an additional $5.32 per ton to compensate for its 25-cents-an-hour contract settlement.

Armco Steel Corp., which settled with an independent union representing workers at plants in Middletown, Hamilton, and Zanesville, O., and Butler, Pa., has asked Office of Price Stabilization for an average increase of $6 per ton on carbon steel. Weirton Steel Co., which also signed up with an independent union, has requested an average price advance of $5.50 per ton.

Consumers Suffer—The strike was exacting a terrific price from the national economy. Unemployment in defense and civilian industries dependent on steel was rising toward the 400,000 mark. Steel inventories were becoming so depleted—despite the estimated 15 pct of total steel capacity now operating—that a brisk conversion market was virtually assured.

Steel consumers are attempting to husband their resources by scheduling plant-wide vacations. But this is only a stop-gap. These steel users know that when the strike ends they can't expect steel deliveries for weeks afterward.

RATIONS: David J. MacDonald, USW secretary-treasurer, hands out 2 days supply of groceries to striking Steelworker George Eberle of Hazelwood, Pa., Local 1843, as part of the union's relief arrangements for its striking members.

ELECTRONICS: Push-Button Inventory

New electronic brain gives split-second, continuous inventory check . . . Now used by American Airlines for reservations . . . Several other applications expected—*By E. C. Kellogg.*

Electronics has made another startling stride in its frequently awesome game of "giant steps" with the development of a push-button inventory control unit. Called the Magnetronic Reservisor, the new information exchange unit provides split-second, continuous inventory information.

Jointly developed by Teleregister Corp., subsidiary of Western Union, and by American Airlines, the magnetic-electronic unit was designed to provide the airline with instantaneous information about seating space available on more than 1000 flights over a period of 10 days. In addition, the Reservisor makes passenger reservations in a quarter of a second.

By simply pushing buttons on a small agent set which resembles an adding machine, an airlines agent can determine whether a desired number of seats are available on any given flight on a specified date. If the passenger wishes to make a reservation, the operator pushes a button and the space is sold instantaneously. Reservation cancellations are made just as easily.

Push Button Control—A master agent set operated by a supervisor performs all the functions of the agent set and in addition has complete control over space inventory information which is stored on a revolving magnetized "memory" drum. The master set can read the inventory on the drum and alter it in any manner desired.

Theoretically the Magnetronic Reservisor principle could be used to tear-drop the Model T design of almost all inventory and accounting systems. For the immediate future, however, there are several factors which limit practical application of the system to specific types of operations.

The system could be best adapted to businesses requiring immediate access to large but not overwhelming inventories in which changes must be made rapidly and accurately. If the time involved in making inventory checks is not a vital factor, use of other systems such as International Business Machine cards might be more practical.

Drumming Up Facts—Since one of the basic units of the Reservisor system is the magnetized memory drum which adds and subtracts the changing inventory facts, the amount of information that can be stored is limited by the size of the drum. Teleregister told THE IRON AGE the present ceiling on information that can be stored on the largest drum practicable is around 1.25 million facts.

Another limitation is cost, which restricts use of the unit to fairly large companies. American paid out $500,000 during the Reservisor's 8-year development and construction period. Price of future units will no doubt be reduced, but production on anything approaching an assembly line basis is out.

Potential Use—In the metalworking field, the Reservisor principle might be applied to large warehouse operations. The unit could give an instantaneous account of supplies and stocks in a string of warehouses stretched across the country.

American's Magnetronic Reservisor has been in commercial operation more than a month, handling 60 pct of the airline's reservation traffic there. The company plans to install agent sets around New York City shortly. Later they will be installed throughout the country. Long distance operation will be conducted on leased teletype circuits.

Future development of the Magnetronic Reservisor system is virtually an unknown.

Since the Reservisor was originally designed to handle reservation inventory problems, the first major mushrooming of the unit will probably be in transportation. Other airlines have already expressed an interest in it, as have railroads.

Until now there has been virtually no publicity about the unit, as Teleregister preferred to wait until the Reservisor was actually in operation. Now that the lid is off, Teleregister is expecting inquiries.

STEEL: Warehouse Stocks Vanish

Demand stays average as supplies are exhausted . . . Plate, bars go first . . . Unbalance will last long after strike's end . . . New pricing order threatens trouble—*By G. G. Carr.*

Warehouse steel stocks were fading away a lot faster than old soldiers this week. As the steel strike went into its sixth week inventory holes were appearing in nearly all lines. Popular sizes in many lines were wiped out.

Demand is good but not sensational. Expected scare buying did not materialize. Business appears to be briskest in the Midwest, particularly in the Chicago area. But now that many small fabricators have no business with strike-throttled larger plants, the market can skid badly. One national chain was cutting manhours in the Midwest, although this was due more to lack of materials than lack of demand.

Demand—Levinson Bros. in Pittsburgh reports business good there, but they are taking care of old customers only. Requests are coming in for larger tonnages than usual and from areas they normally don't sell.

Detroit reports demand is starting to slip as auto plants close. Peter A. Frasse Co. in New York says business is about what it has been. But it would have been a lot better, they claim, if soft items had been decontrolled in the pre-strike period. The West Coast market is firm.

One large chain, strikebound, will accept orders through August for delivery after the strike. They are tagging ordered items now on the floor of their warehouses for delivery when operations resume.

Inventories—Inventories are dwindling in the active warehouses. Plate over 9/32 in. thickness is disappearing, particularly in the smaller warehouses. One large chain reports it can still supply a number of sizes up to ¾ in. thickness and under 72 in. width. Detroit is in very bad shape on both plate and cold-drawn flats.

Bars and rounds are tight all over, particularly Chicago. A large firm there reported its supply of 3-in. cold-rolled rounds "gone." A smaller warehouse could supply hot-rolled bars under 2 in., but over that had literally nothing. Some heavy rounds in 3 7/16 in. and 4⅛ in. sizes are still available, but will be gone in another week or two.

Structurals continue in very poor supply. Situation is so bad in Pittsburgh that one firm has ordered 300 tons from foreign and premium-priced domestic producers for July delivery. Cost delivered to the warehouse, excluding handling costs, will be $6.65 base. They will sell at $5.70 base, so naturally new accounts won't get a crack at them.

After The Strike—Inventories, unbalanced before the strike, will be in even worse shape when it ends. The exception will be firms with United Steel Workers contracts. Their stocks will be nearly full, while non-union warehouses will be virtually bare. Few expect any relief for 3-4 weeks after the strike ends, and some believe it will take months to get back to some semblance of normality.

And warehousemen are worried about being crowded off mill books by a flood of super-priority orders.

Fouled Up—Contributing to the post-strike mix-up will be Office of Price Stabilization. Amend. 3, Ceiling Price Reg. 98, allows warehouses to reflect OPS-approved increases in mill prices only if the warehouse's stocks on the affected products are exhausted or when a tonnage equal to the amount on hand at the time of the increase has been sold. Otherwise, the reseller must wait until the 16th of the following month.

Idea of the amendment was to allow warehouses to reflect inevitable cost increases immediately. But what the order actually does is to allow immediate increases only where stock is exhausted.

Since individual warehouses will be low on different products at different times, the variation in price could be fantastic.

Warehouse Steel Share

	Shipments to Warehouses	Total Mill Shipments	Pct of Total
1st Q'Tr '52	3,842,412	19,848,818	19.35
1951	14,245,392	78,928,950	18.0
1950	13,171,680	72,232,292	18.2
1949	10,219,963	58,104,010	17.59
1948	10,949,920	60,966,999	17.96
1947	10,484,144	63,057,150	16.63
1946	9,304,817	48,775,532	19.08
1945	9,571,436	57,242,240	16.72
1944	8,008,076	60,352,690	13.27
1943	6,823,780	59,905,646	11.39
1942	5,962,068	60,464,774	9.86
1941	9,155,159	61,229,873	14.95
1940	6,686,534	45,850,825	14.58
1939	5,179,660	33,122,628	15.63

ALUMINUM: A New Energy Source?

Pitt Consol pairs two old ideas to get electric power from coal . . . Predict 80 pct efficiency . . . This is Sen. Kilgore's "new process" for W. Va. aluminum smelter—*By R. L. Hatschek.*

A pair of new developments threw sharper focus on Sen. Harley M. Kilgore's proposal to build an aluminum reduction plant in West Virginia (THE IRON AGE, July 3, 1952, p. 158). One was the report of the Joint Committee on Defense Production. (See p. 174.) The other was the disclosure of a process for converting coal directly into electrical energy by Pittsburgh Consolidation Coal Co.

The Senator's proposal was to build an aluminum smelter on a navigable river in West Virginia near a plentiful supply of coal. This would be done in the event that a long-term agreement for quantities of Canadian metal was not made. Consumers of the light metal would be offered stock in the new company in proportion to aluminum requirements.

Aluminum and Power—But the aluminum industry is tied to cheap power. And Pitt Consol has come up with something that may prove the answer for cheap electricity from coal. This process is the one that proponents of West Virginia aluminum are counting on.

While seeking ways to boost coal use, Pitt Consol scientists came up with a clever combination of two old principles. Normal method of generating electricity with coal is to turn a generator with a steam turbine. The new method, still in experimental stages, eliminates the turbine and substitutes a battery-like "fuel cell" for the generator.

Here's what happens: Carbon is heated in the presence of steam, producing a mixture of carbon monoxide and hydrogen. This gas then flows over the cathode of the cell, picks up oxygen and carries it off. This causes more oxygen to flow through the electrolyte from the anode. Oxygen is supplied to the latter by air flowing over it. Cell action produces an electromotive force of 0.07 to 0.09 volts, amperage, of course, being dependent on electrode area. A series hook-up will boost the voltage.

Unit Described—Any form of carbon, such as plain bituminous coal, can be used though the developers of the process believe the best form would be a reactive type such as provided by low-temperature carbonization of coal. Both electrodes are a porous mixture of iron and iron oxide. The electrolyte is described as a refractory-type material which must contain some rare earth elements such as cerium or thorium.

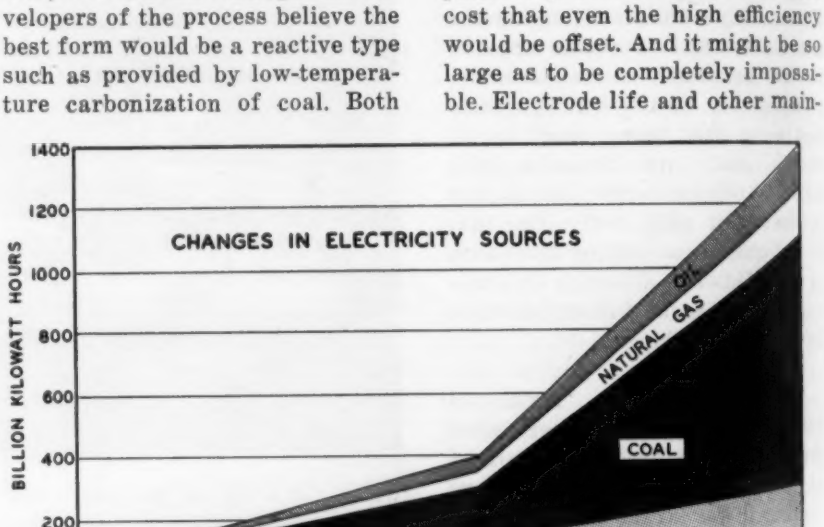
Anode is of such composition that, in relation to the cell itself, oxygen combining to form iron oxide as it passes over the cell brings about various chemical changes resulting in release of energy.

Super Efficient—One of the real beauties of the process is that the gasification process requires heat while the fuel cell gives off heat—enough to maintain the process once started. For this reason, the fuel cell is placed inside the gasification chamber. To add even greater thermal efficiency, hot exhaust gases are used to pre-heat water for the steam-carbon reaction.

This recycling of heat energy is expected to result in an amazing efficiency of near 80 pct, according to Pitt Consol. Conventional steam-turbine generating plants transform only about 35 pct of the fuel's energy into electricity.

The conservative scientists are quick to stress that the process is still at the experimental point and there are many unknowns yet to be solved. These are the economic factors of the revolutionary system.

It is possible that a commercial plant might be of such size and cost that even the high efficiency would be offset. And it might be so large as to be completely impossible. Electrode life and other maintenance necessities are also unknowns. But Pitt Consol is optimistic and doesn't believe any of the hurdles will prove too high.



A few more years of experimentation are anticipated by the company before it would prove feasible to build a plant. And then it would take an estimated 2 years to build it. Pitt Consol predicts a 5-year minimum before the system can be tried out commercially. But then what?

Location? — No one has made any public statements about the site of the proposed aluminum smelter other than saying it would be on a navigable river in the Mountain State. But the *Fairmont Times* has run a story insisting that the town has the ideal location. It is on the navigable Monongahela River near a plentiful coal supply.

STEEL: Why U.S. Outproduces Britain

English productivity team after U. S. tour cites larger units in larger plants, more and better raw materials, fuels as helping U. S. . . . Need less labor because of mechanization.

America's steel industry and steelworker have a head start to higher productivity than their British counterparts because of larger units in larger plants, purer and more abundant raw materials, faster driving of plant, and use of high grade fuels.

These are the conclusions of the British Iron and Steel Productivity Team which spent over 5 weeks visiting U. S. steel plants (mostly in the South and West).

What heightens productivity for America? First of all Britain's market is but one-sixth the size of America's—and because England exports proportionately more, its market is much less standardized. In the U. S. ranges of product size and quality have been reduced. Broader tolerances and less rigid specifications are encouraged.

Warehouse chains of steel firms expedite sales of small tonnages. A cost disadvantage for America is long shipping distances.

HIGH-UP: Scaffolder Michael Organ rigs a construction platform for a power plant chimney high over the Thames River for one of London's reconstruction projects.

Richer Ore—America uses ores that are richer in iron content; 40 pct Fe for Britain, 50 pct for the U. S. On the average, American coking coal is of better quality, easier to mine, and cheaper than England's. There is room for improvement in British coke preparation.

American steel furnaces have the advantage of great reserves of cheap oil and natural gas which are piped to most parts of the country. Cheap fuel is a cornerstone of productivity. British steelmakers have taken the cue. One-quarter of British openhearths have been converted to oil firing within the past 5 years with a 10 pct hike in output.

On the basis of its observations, the team recommends that all integrated steel plants should aim at an annual capacity of between 750,000 to 1 million ingot tons. It suggests that blast furnaces should have hearth diameters of 25 ft when imported ore is used and 27 ft for domestic ore.

Faster Pace — American steel plants are driven at high rates. This can be done because of the purity of raw materials and fuel, and the size of plant units. But even after allowing for these advantages, American steelworkers can still get 10 to 20 pct more out of each unit than in Britain. This can be explained by the American practice of using more coke in blast furnaces and by accepting a reduced lifespan of openhearth roofs.

American rolling mills weather a faster pace with little if any increase in shutdown or maintenance costs.

Per unit production in American plants is higher than in Britain despite the fact that fewer workers are employed per unit. Mechanical and materials handling equipment economize on labor and enable continuous operation at good speed. The difference in manning rates is particularly noticeable for steel furnace maintenance with greater working space and mechanical aids.

Labor Harmony—A larger measure of uniformity in wages and working conditions exists in the U. S. where the United Steel Workers union negotiates with various companies. "Job evaluation" is said to have reduced grievances. Output bonus schemes are less common than in Britain but where employed are direct and effective. Industrial relations seem good at the local level but less stable than in Britain where there has been no major dispute in 40 years.

Although American training programs are no better than England's, safety of the worker is emphasized. American wage rates are much higher. Compensating is cheaper transportation. The rate per ton-mile for ore and coal on railroads is two-thirds or less that of Britain. American freight cars are bigger. Britain can help herself with shipbuilding and port development.

Perhaps because metallurgical problems in America are relatively simple, research within the steel industry is on a small scale. But ferrous metallurgical research in America as a whole is extensive.

Keep It Low—By international standards cost of making iron and steel in Britain is low. It can only be kept this way by continuous modernization and most effective use of equipment. Capital development, use of fuel oil, and introduction of the continuous working week has already boosted output of finished steel per worker by 25 pct since the war.

The team urges judicious investment in new equipment. Plans are now afoot to increase present capacity. An annual capacity of about 20 million tons could be reached in a reasonable time only if annual capital investment of $16,800,000 is maintained or even exceeded.

TV: Strike Kills Expansion Hopes

Lack of steel is body blow to communications industry . . . FCC flooded with bids for new stations . . . New facilities delayed . . . Cobalt, nickel also tight—*By A. K. Rannells.*

The steel strike and its probable delaying effect on construction has struck a body blow to the communications industry, struggling to get started on a multi-million dollar program for its growing baby—television.

Recent lifting of the freeze on TV paved the way for the industry to plan construction of new facilities. Federal Communications Commission is prepared to assign channels for more than 2000 transmitters in nearly 1300 towns and cities.

Already FCC has received an unexpected flood of applications for channel assignments and operating permits. These amount to upwards of 500, including requested changes in about 175 pending applications.

Won't Guess—Commission officials decline to estimate how soon the first channels will be assigned. Processing takes time. But it is expected that approvals will begin within 90 days, with processing well underway by the end of the year.

Lag in receiving permits is only part of the problem. Materials will be needed for construction. Plans had been made by control agencies to ease this situation by increasing self-certification authority.

These have been shelved until after the strike ends. If station permits were available immediately, it would still be considerable time before the 500-to-1000 ft antenna towers could be erected. It is now doubtful if structural steel losses to these and other non-defense projects can be made up this year.

Picture is a little brighter for manufacturers of transmitting equipment. Third-quarter copper allotments will be at least 50 pct of base period use and aluminum quotas are set for 55 pct. Allotments will be no less in the fourth quarter.

Other Troubles—More likely, two other metals will be the controlling factors in equipment manufacture and production of components and parts—steel and nickel.

National Production Authority officials say that the drain of increasing jet engine production on cobalt and nickel will cut deeply into production of radio and TV components such as magnets and tubes.

Still a third problem is the lack of qualified engineers.

Black & White—Ban on color TV was removed in June with the tacit understanding that no engineering personnel would be diverted in any way from defense. And it is estimated that this year's graduating engineers are filling only about 20 pct of needs.

So your town still may not get that TV station for a year or more—unless it happens to be in a distress area.

Strike Delays Steel Quotas

Final levels of steel allocations for the fourth quarter must wait for the settlement of the steel strike and the calculation of production losses.

This was revealed last week by Defense Production Administration boss Henry H. Fowler in making aluminum and copper allocations for the quarter. However, preliminary allocations may be issued late this week or early next.

Generally, direct defense and military programs will get more copper and aluminum than for the third quarter. Supporting programs will get about the same.

Manufacturers of major consumer durables also will get about the same level of allotments as the revised allocations for the third quarter. This will be about 50 pct of base period for copper and 55 pct for aluminum.

Industry Controls This Week

Aluminum Compounds—Amend. 7, SR 7, CPR 22 grants an increase on aluminum fluoride and synthetic cryolite prices.

Brass, Copper—Dir. 1, M-16 authorizes brass mills, brass and bronze foundries and wire mills to place orders 2 months in advance. Amend. 1, CPR 68 and Amend. 1, CPR 110 increase ceiling prices of brass mill and copper wire.

Fuels—SR 9 and 10, CPR 17 raise ceiling price levels of gasolines, napthas, liquefied and other gases and heating oil.

Iron, Steel—Amend. 2 and 3, CPR 98 establish new methods for determining ceiling prices of iron and steel products handled by small volume resellers. Amend. M-1 will remove iron and steel pipe with diameters of not more than 36 in. from the controlled materials list in the first quarter of 1953.

Machinery—Rev. 1, CPR 105 affects the pricing of used industrial and construction machinery. Amend. M-43 tightens use of priority ratings for construction machinery and equipment.

Nickel Alloy—Amend. 8, CPR 5 establishes a new basis for premium charges on nickel alloy scrap.

Scrap—NPA M-92, Dir. 1, revoked. Frees autowreckers from inventory and turnover regulations.

Zinc—Amend., NPA Reg. 1 removes inventory limitations on zinc slab.

Ferromanganese Order Planned

Producers of ferromanganese may soon be covered by a proposed pricing regulation, an initial draft of which has been shown to representatives of the industry.

This order, covering producers only, would continue price differentials for various types of manganese, in conformity with terms of the General Ceiling Price Reg.

Extend Decontrol Timetable

Decontrol of steel production and distribution now must go over until last half 1953.

This is Defense Production Administrator Fowler's current estimate—and it is based on an early settlement of the steel strike.

In a letter to Chairman Maybank of the Joint Congressional Committee on Defense Production, DPA's head man estimated loss of steel through the strike, as of July 3, at no less than 11.4 million tons.

Even if work at the mills were to resume at once, he said, at least another 2 million tons would be lost while plants were getting back into full production.

Losses—An immediate end to the strike, he added, would mean that total production this year would necessarily fall below 99 million ingot tons. Every additional week adds proportionately to the loss.

This loss cannot be replaced, no matter how efficient the operation of Controlled Materials Plan in distributing output. It means impact of the strike would continue to be felt by many industries for the remainder of the year.

In the case of consumer durables, for example, steel inventories will have been materially used up. Even with resumption of steel production, defense and related programs will get first call.

This means that first deliveries of steel to less essential industries will necessarily be delayed for several weeks after work resumes.

Put Clamp on Building Machinery

Placing of orders for construction machinery this week had become a definitely tough proposition for non-defense contractors.

National Production Authority July 3 amended its construction machinery order (M-43) to bar the placing, accepting, and scheduling of rated orders for construction machinery and equipment except to holders of A, B, C, E, Z1, or Z2 ratings.

Ratings already on a manufacturer's books do not have to be re-

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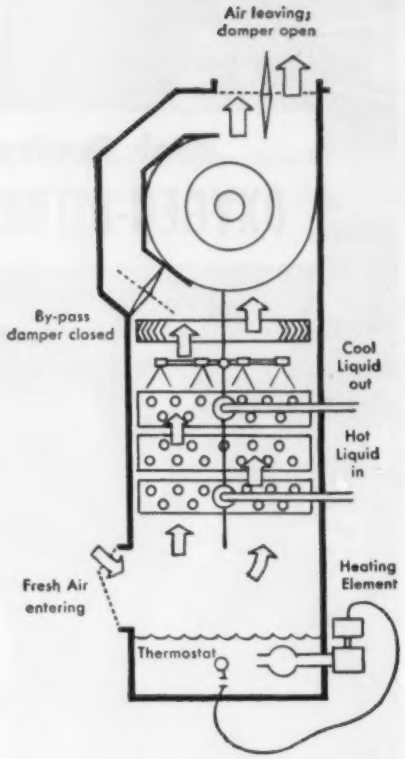

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Quench Oils	Aluminum, copper, steel, nickel and alloys.
Cutting Oils	Diesel, aircraft, automotive and other engines.
Lubricating Oils	Chemical processes, plastics, adhesives.
Cooling water and brine	Gears, bearings, forgings and castings.
Cooling gas and compressed air	Wire, controls, electronic products.
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validated, and parts are not affected by the amendment to the order.

NPA advises users of construction machinery to apply for permission to use the Z1 rating if they are not authorized to use any of the other priority ratings.

The new amendment also provides that no manufacturer shall be required to accept rated orders for delivery in any one month for any model of any type of construction machinery (including parts) in excess of 50 pct of his production schedule of that model for that month, or 50 pct of his average monthly shipments of that model during the 6-month period Jan.-June, 1950, whichever is greater.

Metal Self-Certification Eased

In an amendment to Dir. 1 of CMP Reg. 1, National Production Authority further "liberalizes" the provision which increases self-authorization quantities for copper and aluminum.

A manufacturer of "B" products now is permitted to self-authorize separately for the highest quantity of each kind of controlled material under any one of the three categories in Sec. 3 of the direction. It is not necessary to self-authorize for all kinds under any one particular category.

At the same time, NPA emphasizes that B product manufacturers may not, with certain exceptions, obtain part of their controlled materials by self-certification and part by Form CMP-4B. It must be one or the other for the third quarter.

Pay Rises for Engineers—Only

Pay increases for professional engineers, if followed by similar adjustments in salaries of employees supervised by those engineers, could result in employer violations of Salary Stabilization Board regulations.

Professional engineers working in a professional capacity are, by direction of Congress, exempt from salary limitations. This specific allowance, SSB points out in issuing its Interpretation No. 12, does not affect salaried persons.

Aluminum Price Order Changed

Ceiling prices of aluminum fluoride and synthetic cryolite are temporarily adjusted, in a price-setting action retroactive to June 1, to allow producers' sales on at least a break-even basis.

Amend. 7 to Supplementary Reg. 7, Ceiling Price Reg. 22, sets dollars-and-cents ceilings for U. S. sales of these items between June 1-Aug. 31. Ceilings were computed to reflect higher costs of required raw materials.

Two concerns, Aluminum Ore Co. and Reynolds Metals Co., produce aluminum fluoride and fluxing grades of synthetic cryolite, while only the first-named concern makes sales of these materials. Aluminum Ore Co. applied to Office of Price Stabilization on about Nov. 1, 1951, for a ceiling adjustment and had been suffering losses on sales since that date.

Copper Ordering Time Extended

Wire mills, brass mills, brass and bronze foundries and miscellaneous users may now place advance orders 2 months ahead and may place bigger orders.

This is authorized in an amendment last week to M-16, Dir. 1, effective July 1.

Such users, upon receiving their authorizations, are permitted to place orders for the following percentages of the copper authorized:

Up to 50 pct of copper raw materials (other than refined copper; 75 pct of the quantity of domestic refined copper; and 100 pct of the quantity of "other" refined copper, including imported.

"Well, no. There's nothing actually in the rules. But the safety supervisor feels . . ."

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T-J DOUBLE RIVITORS AND CLINCHORS!

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Set two rivets at a time with this new T-J Dual Rivitor! This machine is equipped with 10" hoppers, and tooled to automatically feed and set two ¼" dia. x ⅝" long wagon box head rivets at a time in elevator chain and raddle or elevator flight assemblies for farm implements. Controlled by one foot pedal.

CLINCHORS

Set two nuts at once with the new T-J Double Clinchor! This machine is tooled to feed and set ⅜" x ½" x 1/16" thick Fabri-Steel nuts at each operation. Both Clinchors are tripped by the same foot-operated valve. Adaptable to a wide range of clinch nut setting problems.

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T-J Clinchors set clinch nuts 3 to 5 times faster! Fully automatic . . . controlled by a single foot pedal. Available in Underfeed and Gravity feed models, throat depths 8" to 36".

T-J Rivitors automatically feed and set solid rivets . . . with high production! Electrically-powered Rivitor sets 1/16" to ¼" diam. solid steel rivets up to ⅞" long. Air-powered Rivitor sets aluminum alloy rivets up to ¼" diam. or steel rivets up to ⅛" diam. and up to ¾" long. Throat depths 8" to 36"

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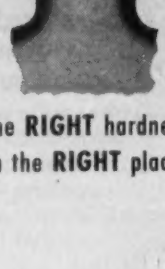

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Conversion:

Market staging comeback— slowly . . Lifespan depends on steel strike.

The conversion market is coming back. It's not here yet with a bang. But it's building up steam. And once underway it will be good for 4 to 6 months, perhaps longer, depending on duration of the steel strike.

Some consumers already are lining up conversion ingots. A mill already in production is sold out on ingots beyond the end of the year.

Chief reason why a frantic rush for conversion steel has not started appears to be a cautious attitude of consumers regarding future market possibilities for their products. Another reason is the hope that when the strike ends they might be lucky enough to get delivery from normal sources.

Not Ready Yet—A leading conversion broker reports this typical reaction from a prominent producer of appliances: "We're not interested in going into conversion immediately. We first want to take a good look at the market for our products, then we'll decide."

Inquiries just now are heavy. But most of them want to talk price. The consumer wants to know what he will have to pay—if he needs to. There are a lot of inquiries on forging quality steel, but nobody wants to pay the conversion price—just now.

When the rush starts, its duration will depend on several factors. Demand for consumer goods is one. Another factor is the iron ore situation. The sympathy walkout of ore miners has halted shipments over the Lakes. This is expected to have an effect on steel production this winter. Mills may well be forced to curtail operations for lack of ore.

Defense Orders—There is still another aspect that will affect the conversion picture. This is the extent to which the military and atomic energy planners move in on the available steel once production is resumed. The way it looks now they are planning to move in fast to grab off a big chunk of initial output to make up lost time.

Shareholders:

Study shows 6.5 million hold stock . . . Men own more than women.

Statistics on ownership of stock compiled by the Brookings Institution show that there are about 6.5 million individual holders of publicly held stock issues in the U. S. There are 30.3 million shareholdings. The discrepancy arises from two facts: (1) A good portion of the shareholdings are in the names of fiduciaries such as trustees, guardians, investment companies and other non-individual holders. And (2) individuals hold an average of 4.1 separate issues.

About the same number of men and women are named as shareholders but men own slightly over four shares for every three held by women. An estimated 27 pct of all stock is held by people in the 50 to 59 year old age group with people over 60 holding nearly as much.

Geographically, New York State leads the list with over 20 pct of the total shareholdings. Pennsylvania, California, Illinois and Massachusetts fill out the top five.

$56 Million Stock Offering Filed

Deere & Co., Moline, Ill., is planning to place 691,276 shares of the firm's $10 par common stock on the market together with $50 million in debentures, according to a registration statement filed with the Securities & Exchange Commission.

Expenditure of the net proceeds will include up to $21 million for constructing and equipping a new chemical plant and another $33 million will be used to repay short-term loans.

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While you slept, the plant where you worked burned down! It happens—somewhere—almost *every* night. And it happens because Management neglected to provide adequate fire protection, even though they *thought* they had done so!

Fires break out whether you are ready for them or not. These fires may occur at vital points—where production can be quickly knocked out. Machines are destroyed, records lost, buildings leveled—and manpower crippled.

Thinking plants are safe isn't enough. It's essential to *know!* A CARDOX survey will show how CARDOX "Low Pressure Carbon Dioxide Systems*" will guard the danger spots, do away with fire extinguishment losses—provide all-around, over-all fire protection. For full particulars, merely tell us who and where to address you.

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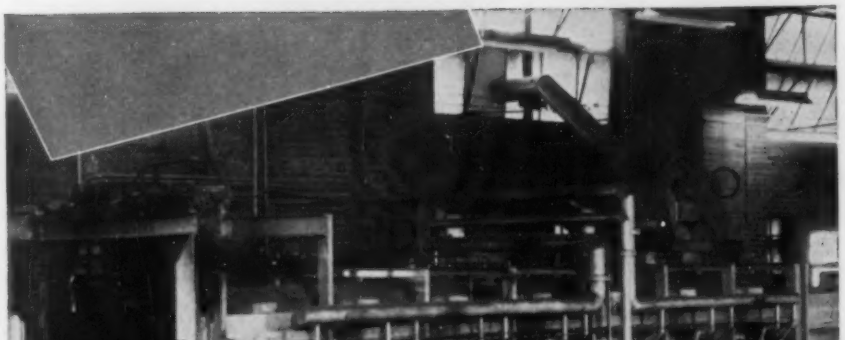

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Contracts Reported Last Week

Including description, quantity, dollar values, contractor and address. Italics indicate small business representatives.

Replenishment of motor vehicle parts, 1100 ea, $30,360, Deubal Art, Tool & Machine Co., Detroit.

Replenishment of small arms parts, 2000 ea, $27,480, Piquetee Industries, Detroit.

Replenishment of motor vehicle parts, 2400 ea, $27,617, Dana Corp., Toledo.

Replenishment of tools, 1731 ea, $146,736, Tarnow Electric Supply Co., Detroit.

Replenishment of tools, 220 ea, $81,356, Metallizing Engineering Co., Long Island City, N. Y.

Replenishment of motor vehicle parts, 35800 ea, $57,663, Hercules Motors Corp., Canton.

Replenishment of motor vehicle parts, 48500 ea, $28,181, Hercules Motors Corp., Canton.

Replenishment of motor vehicle parts, 8000 ea, $43,840, Saginaw Products Corp., Saginaw, Mich.

Replenishment of motor vehicle parts, 860 ea, $60,269, Ward LaFrance Truck Corp., Elmira, N. Y.

Replenishment of motor vehicle parts, 11680 ea, $40,445, Gar Wood Industries, Inc., Wayne, Mich.

Replenishment of tank and combat vehicle parts, 47300 ea, $141,802, The Electric Auto-Lite Co., Toledo.

Replenishment of tank and combat vehicle parts, 5200 ea, $33,579, Borg-Warner Corp., Rockford, Ill., *L. M. Swenson.*

Replenishment of tools, 43000 ea, $360,340, The McKay Co., Pittsburgh.

Replenishment of motor vehicle parts, 22737 ea, $93,267, Dana Corp., Toledo.

Replenishment of tools, 300 ea, $37,350, Modern Collet & Machine Co., Ecorse, Mich.

Replenishment of hardware, 5900 ea, $34,000, International Harvester Co., Detroit.

Replenishment of other, 6900 ea, $53,152, Federal Motor Truck Co., Detroit.

Replenishment of hardware, 8223 ea, $90,929, C. K. Turk Corp., South Bend, Ind.

Replenishment of tools, 1440 ea, $89,247, James C. Heintz & Co., Inc., Cleveland.

Replenishment of motor vehicle parts, 13000 ea, $214,500, United Auto Parts Co., Inc., Kansas City, Mo.

Replenishment of motor vehicle parts, 6500 ea, $41,813, Active Gear Co., Inc., Chicago.

Replenishment of motor vehicle parts, 11 ea, $83,490, General Motors Corp., Pontiac, Mich., *J. P. McManus.*

Replenishment of motor vehicle parts, 31 ea, $47,770, International Harvester Co., Wash.

Replenishment of motor vehicle parts, 3000 ea, $32,250 GMC/AC, Flint, Mich., *L. R. Steffen.*

Replenishment of motor vehicle parts, 5994 ea, $42,800, Floyd Rice Sales & Service, Inc., Detroit.

Replenishment of tools, 77577 ea, $44,218, Gem Mfg. Corp., Pittsburgh.

Replenishment of motor vehicle parts, 36 ea, $166,549, International Harvester Co., Wash.

Cup, canteen, 750000 ea, $61,297, General Products Corp., Union Springs, N.Y.

Heater, tent, gasoline, 200 ea, $113,800, The Silent Glow Oil Burner Corp., Hartford, Conn.

Helmet, steel M 1, 176000 ea, $377,979, McCord Corp., Detroit.

Stove, tent, M-1941, 144000 ea, $1,132,560, Nesco, Inc., Chicago.

Burner, oil stove, tent, M-1941, 27000 ea, $405,270, Columbus Metal Products, Inc., Columbus, Ohio.

Repair parts for centrifugal pumps, 619, $33,376, Allis Chalmers Mfg. Co., Milwaukee.

Repair parts for gyro-compasses, 5814, $28,490, Arma Corp., Brooklyn, *John V. Stocks.*

Repair parts for turbines, 203, $25,324, Schutte & Koerting Co., Cornwall Heights, Pa.

Exhaust mufflers for diesel engines, 96, $30,870, The Maximum Silencer Co., Hartford, Conn.

Valves and repair parts, 240, $30,106, Foster Engineering Co., Union, N. J.

Repair parts for piping & deck equipt. 101812, $54,514, Atwood & Morrill Co., Salem, Mass.

Small Business:

Senate committee charges lack of coordination in contract awards.

Coordination is at a low ebb in the labeling of military contracts for small firms, despite Congressional urging that the Armed Forces cooperate with Small Defense Plants Administration for this purpose.

This charge is brought against the Army and Navy in a new report from Senate Small Business Committee, which describes as "inexcusable" the lack of efficiency in the contract - earmarking field. Weighing the amount of small-company participation in the rearmament program, the solons say the small business share of the military procurement dollar has decreased steadily since Korea.

Extent of this downward trend is outlined as follows:

In the fiscal year ended June 30, 1950, small concerns received 24.5 pct of the defense dollar in prime contracts. This amount dropped to 20.9 pct in the ensuing year and apparently is continuing to fall. For the first 9 months of fiscal 1952, the small-company percentage of prime contract dollars was 18.4.

Recommendations—Some of the trouble, according to the report, is a "lack of authority" on the part of those officers who direct military small business programs. To bring about an improvement in contract assignments, the committee recommends:

1. Head of the Munitions Board Office of Small Business be designated a vice-chairman of the board. (Richard Lennihan, who directs this office, now attends staff meetings and discusses policy questions with the vice-chairmen and the MB chief, John D. Small.) There should be comparable advancement for the heads of similar offices in the Army, Navy, and Air Force.

2. These departments immediately coordinate their activities affecting small business.

3. There be wider use of small business production pools.

4. The military assure small contractors of sufficient time to bid.

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Unloads HOPPER CARS Faster... Cleaner

Hewitt-Robins Car Shakeout Really Shakes OUT The Car

Saves Time: Unloads 70-ton hopper cars *"broom clean"* in as little as 90 seconds . . . even when loaded with hard-packed material.

Saves Manpower: Everything under "finger-tip" control except opening the hopper doors. Two men—or even one—can handle entire operation.

Saves Money: Less car damage — no need for demurrage.

Here's Proof: Operators say . . . "It is in operation 24 hours a day unloading 3/8" x 0" coal and *saving us $70.00 a day* since first put into operation in 1946" . . . "It has *reduced our unloading time* from 100 man-hours to 18 man-hours per day" . . . *"Pays for itself* every 105 days by merely eliminating damage to railroad cars."

Two Types: The HD Car Shakeout for continuous, high-speed car unloading—the GS Car Shakeout for operators who unload 15 or less cars per day.

Get The Facts . . . for the HD Car Shakeout, write for Bulletin No. 128-A—for the GS Car Shakeout, write for Bulletin No. 130.

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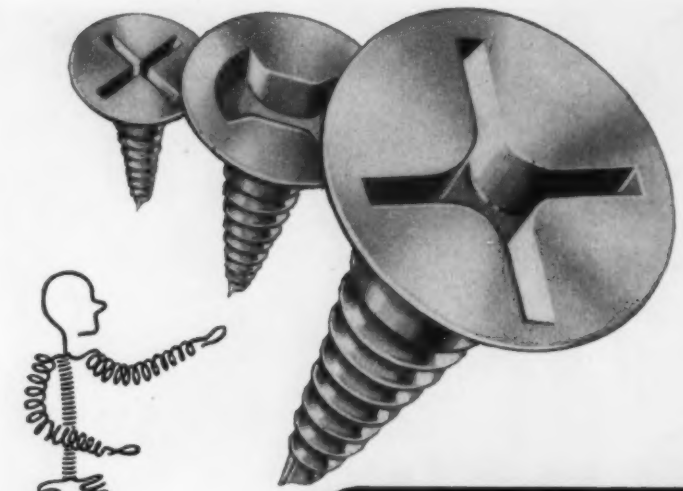

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The excellent flow properties of Keystone "Special Processed" Cold Heading Wire assures the desired upsetting and die forming qualities required for the most efficient production of recessed-head screws. Shop records show that die and plug life are often more than doubled . . . finished product rejections are minimized . . . the cost of expensive final inspections is reduced. Compare Keystone "Special Processed" Cold Heading Wire for any tough cold heading job.

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Keystone's "Special Processed" Cold Heading Wire is now available in C-1035 and C-1038 analysis for high strength, heat treated screws and bolts.

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Special Analysis Wire, Setting New Standards of Performance

Construction Decline Expected

New construction outlays for the first half of 1952 reached a record figure of $15 billion, latest government figures show.

But indications are that the 1952 total may not reach the previously-forecast $32 billion level.

One reason for doubting the earlier forecast is, of course, the steel strike, the impact of which will show up later.

Another is that there is already a declining trend in outlays for industrial expansion because of projects now nearing completion.

Despite a lagging start during the first quarter, the 6-month total was 4 pct above last year. A pick-up in housing starts during the second quarter helped.

Commercial construction did not increase appreciably until June because of restrictions and thus had little effect on the total. Volume during the last half will depend largely on availability of steel for building materials.

Industrial construction for the 6 months totaled $1.2 billion, up $300 million from last year. Store and similar commercial construction was off $210 million from last year's $480 million.

Military construction for the period more than doubled to reach $788 million. Highway expenditures passed the $1 billion figure, an increase of more than $100 million.

Residential housing (new) was off 8 pct but still saw more than $4.3 billion put into place.

"He likes to throw people downstairs."

Manganese:

New government buying depot set up in Wenden, Ariz., under DMPA.

Miners and producers of domestic manganese ore now have a new government depot, located at Wenden, Ariz., to which they can send their output for purchase by Defense Materials Procurement Agency.

General Services Administration operates this facility for DMPA, as it does three other depots opened in conjunction with a 5-year government purchase program to encourage discovery, development, and production of U. S. manganese. Older depots are maintained at Butte and Philipsburg, Mont., and Deming, N. M.

Ore delivered at Wenden must have a minimum 15 pct manganese content and can be accepted only in lots of at least 5 long tons. Procurement will be made only from miners and producers who have notified the government previously of their intention to sell.

Prices will be figured on the basis of $2.30 per long ton unit of recoverable manganese, delivered, less handling and ore processing and treatment costs.

Government Builds Up Lead Stocks

Now armed with appropriations for the purpose, the government's boss buyer Jess Larson is going into the open market to procure 30,000 tons of lead during last-half 1952.

In effect, this will be a reserve for civilian production. It will be held available for resale to industry if and when needed until next January.

Any left-over tonnage in the hands of Defense Materials Procurement Agency as of Dec. 31 will be ordered into the national stockpile.

Back of the decision to buy up this tonnage now is the DMPA belief that present soft prices will not hold. Such a reserve would assure an adequate supply of lead for essential defense and defense-related needs.

Kemp Immersion Melting Pots won't CRACK or BREAK

Save up to 40% on fuel with greater heating surface, faster heat recovery

More and more plants depend on Kemp Immersion Heating for *continuous, trouble-free* performance. Kemp pots, unlike underfired pots, can be used steadily in annealing, coating, tempering, descaling, etc. ...without the threat of *periodic* and *expensive* shutdowns for breakage. And each new Kemp installation means you eliminate costly temperature override, dangerous open flame fire hazards and the clutter of unsightly external pipes and ducts.

EFFICIENCY WITH ECONOMY

With Kemp Immersion Heating, you are assured maximum melting or heating efficiency... *plus* an estimated savings in fuel of up to *40% and more.* Thanks to Kemp engineering, these savings are built into every unit. You get greater heating surface, faster heat recovery, lower dross formation, even lower room temperatures. There's no brickwork to steal heat . . . no external combustion chamber . . . no carbon monoxide. You're money ahead when you switch to Kemp.

EASY TO USE, EASY TO MAINTAIN

The Kemp Carburetor, part of each installation, delivers complete combustion... without waste... without tinkering. One-pipe air and fuel feed reduces installation costs, simplifies maintenance. Kemp service also includes a staff of trained technicians who are instantly available at all times.

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ADSORPTIVE DRYERS • METAL MELTING UNITS • SINGEING EQUIPMENT • SPECIAL EQUIPMENT

Industrial Briefs

Contract — YALE & TOWNE MFG. CO., New York, has entered into a contract to purchase American Sintered Alloys, Inc., Bethel, Conn., in exchange for Yale & Towne stock.

Dedication—THE BUDD CO., Philadelphia, was host recently to 150 prominent civic, industrial, professional, and military figures at a luncheon and exhibit marking the dedication of a new military tank parts plant on Fox St. near Hunting Park Ave.

Overhauling—TEMCO AIRCRAFT CORP., Dallas, is overhauling additional F-47 Thunderbolt fighters under a continuation of its contract with the U. S. Air Force.

Shares Acquired—All the outstanding shares of East Coast Aeronautics, Inc., have been acquired by BARIUM STEEL CORP., New York, in exchange for 27,401 shares of its capital stock and $950,000 in 3-year serial notes.

Elected—At the annual meeting recently of THE INDUSTRIAL SAFETY EQUIPMENT ASSN., Edison L. Wheeler, Wheeler Protective Apparel Co., was elected president.

Test Shipments — AIR MATERIEL COMMAND is canning clothing. Test shipments of clothing packed in steel containers (cans) have proven them cheaper and better than other types of clothing packages in general use.

New Film—THE HI-SHEAR RIVET TOOL CO., Los Angeles, has available for loan or purchase, a 16 mm color and sound motion picture, *Riveting With Hi-Shears.*

Being Built — Nine openhearth furnaces now being built at U. S. Steel's FAIRLESS WORKS, Morrisville, Pa., by Koppers Co., Inc., will be equipped to largely eliminate smoke usually rolling from the stacks of these furnaces.

Representative Appointed—BEDFORD TOOL & FORGE CO., Bedford, Ohio, has appointed Gurley-Ortman, Inc., 3210 N. Major Ave., Chicago, as their Chicago representatives.

Supply Store — An oil field supply store has been opened at Hadacol, southeast of Midland, Tex., by NATIONAL SUPPLY CO., Pittsburgh.

Distributor—Rockford Tool and Transmission Co., Rockford, Ill., has been appointed distributor by PARKER APPLIANCE CO., Cleveland.

50th Year — BULLDOG ELECTRIC PRODUCTS CO., Detroit, is celebrating its 50th year in the manufacture of industrial electrical equipment.

Completion—The new 100,000 sq ft branch plant of BLACK & DECKER MFG. CO., was recently completed at Hampstead, Md. The new plant was designed and built by The Austin Co.

Automatic Pilot—The first automatic pilot with unlimited maneuverability was installed in the new F-94C Starfire jet warplane. It was developed by WESTINGHOUSE ELECTRIC CORP., in cooperation with Air Material Command's Armament Laboratory, Control Equipt. Branch.

Directory — THE REFRACTORIES INSTITUTE, Pittsburgh, is undertaking to compile and publish for wide distribution a Product Directory of Refractory Manufacturers in the U. S.

New Address—By July 14 all manufacturing and operating facilities of the former WHEELCO INSTRUMENTS CO. will have been transferred to Rockford, Ill.

"Do you know how miserable you're making it for my employees, starting my day off like this?"

New Company—Robert G. Evans, one of the original founders of Clipper Mfg. Co., has announced the formation of a new company, ROBERT G. EVANS CO., with headquarters at 6315 Brookside Plaza, Kansas City, Mo.

Certificates of Necessity — FOOTE MINERAL CO., Philadelphia, received two certificates of necessity covering production of lithium chemicals as a portion of the 10-million-lb-per-year goal set recently by Defense Production Authority.

Award Presented — Harold F. Wood, Jr., assistant sales manager in charge of knife products, HEPPENSTALL CO., has been given its President's Award as "Salesman of the Year."

New Home — COMMERCIAL FILTERS CORP. will move from Boston to its new factory in Melrose, Mass. Plant consists of three buildings with total area of 135,000 sq ft.

Increase Production—ARMA CORP., New York, has been authorized by the U. S. Army to increase by approximately four times their production of new type fire-control equipment for tanks.

Slab Heating Furnace—Design, engineering and materials for a new slab heating furnace for National Steel Co. of Brazil at Volta Redonda are being furnished by RUST FURNACE CO., of Pittsburgh.

Open House—Recently JOSEPH T. RYERSON & SON, INC., held an open house for some 2600 customers, friends, and well-wishers at the St. Louis plant at 5 Clifton St., in celebration of the completion of a large addition to its steel service facilities.

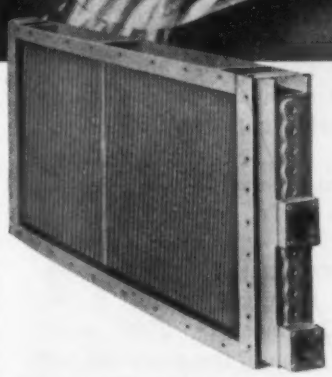
Honored—Edward J. Roehl, manager of technical developments, Thomas Strip Div., PITTSBURGH STEEL CO., Warren, Ohio, has been honored for the fifth time by the American Electroplaters Society at their annual convention.

New Offices — PENN METAL CO., INC., has opened new offices at 1025 Connecticut Ave., N. W., Washington, D. C. Cecil R. Cooley will be manager.

Revere-Trained Copper

HELPS TRANE CONTROL HEAT!

Trane Kinetic Orifice Tube. Orifices eject steam in direction of condensate flow, materially increasing efficiency, getting more heat out of the steam. Specifications for this copper tube were developed mutually by Trane and Revere.



Trane Type SDS Coil containing Kinetic Orifice Tubes, for heating use.

One of Revere's customers is the famous Trane Company, which makes heating, cooling and air-conditioning equipment for home, industrial, marine and similar applications. Trane relies on copper for tubes, because of high heat conductivity, resistance to corrosion and easy workability.

Like so many other Revere friends, Trane maintains close relations with the Technical Advisory Service, collaborating with it in developing specifications, studying specific corrosive conditions, and other matters of mutual interest.

For example, take the Kinetic Orifice Tube, a Trane design to overcome certain old handicaps found in the tube-within-a-tube steam distributing system. The Kinetic Orifice utilizes a jet action to accelerate the flow of condensate by discharging the steam in the direction of condensate flow. To produce such orifices in a copper tube requires a combination of shearing and flaring, and at first it was thought that the temper required for these operations would be so soft as to make it difficult to maintain the required straightness. However, study by both organizations finally developed a temper both workable and strong, now proved by several years of use.

If you are not now collaborating with the Revere Technical Advisory Service, perhaps it would be to your advantage to do so. Call Revere.

Trane projection-type Unit Heater employs copper tubes for both high pressure and low pressure work.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

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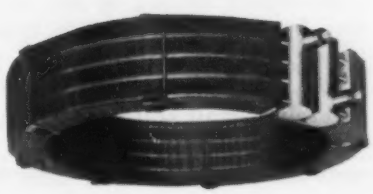
Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.— Sales Offices in Principal Cities. Distributors Everywhere

SEE REVERE'S "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY



Coil for projection-type Unit Heater. The easy bendability of copper tube is a decided asset in forming the circular coils.

Industry Beginning Long Holiday

Many workers won't come back after Fourth of July . . . Auto firms out of steel . . . Some are closed down tight . . . Others on day-to-day basis . . . Thousands laid off—*By R. D. Raddant.*

The Fourth of July holiday was destined to be a lengthy one for more than 100,000 auto workers. And those who did come back to work did so on either a short week or day-to-day basis.

The creeping paralysis that started in the parts plants caught up with the assembly lines. These had kept operating until the last part was used and the last complete car finished.

Ward's Report predicted that more than 700,000 workers who depend on the auto industry would be idled shortly. Plant after plant posted closing notices.

Ford Down Tight—Ford announced that all of its manufacturing and assembly plants throughout the country were at a standstill before July 4. A company spokesman said that it had no information on future operations. Ford plants employ 69,000 hourly rated personnel in the Detroit area alone. All were idled. General Motors and Chrysler were in the same situation.

On July 8, GMC Truck and Coach Div. began to lay off its workers with all but a handful to be sent home by July 15. Both commercial and military truck production was cut July 3 but production of coaches, constructed primarily of aluminum, continued for a short time.

Only Hudson appeared to be in a fairly good situation and was prepared to maintain its operations through July. Nash will attempt to soften the situation by closing down July 3 and granting the 2 weeks' annual vacation, hoping for an early reopening of the plant.

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS	TOTAL
July 5, 1952	68,844*	18,208*	87,052*
June 28, 1952	97,867	26,470	124,337
July 7, 1951	76,077	22,010	98,087
June 30, 1951	121,100	35,005	156,105

*Estimated

Source: *Ward's Reports*

Car Shortage Seen—A sure development of the strike would be a shortage of cars before the end of July. It is possible, however, that the deflationary effect of the strike on the national economy would cut demand proportionately. The lack of steel and the inability to plan ahead had already forced changes in new model announcements. The length of the strike is now the determining factor in this department.

It is just possible that some of the auto plants shouted "Wolf, Wolf" a little too soon when they predicted shutdowns early in June. But as the strike went into its second month, it was no joke, the Wolf was really at the door.

Secondary impact of the strike also began to reach other industries. Rubber companies, for example, have been directed to severely curtail shipments of rubber parts. Unless they decided to maintain production and store finished products, these industries will also be forced to start layoffs in the very near future.

Trucks Changing—Strictly enforced weight limitations on highway payloads are forcing the emphasis in truck construction to be placed on development of lighter but more powerful trucks.

This was indicated in the new truck models recently announced in the heavy and medium truck lines by GMC Truck and Coach Div. Weight reductions in one model amounted to 865 lb. This means an extra payload and lower ton-mile costs.

Other cost saving developments noted were a shortening of all heavy duty models to allow use of longer trailers in limit states, lighter weight springs, integral type cast spoke springs, lighter cabs on heavy models, and other chassis weight reductions.

Continental Closes—Continental Steel Corp., one of the Chicago district's last remaining steel producers, bit the dust last week.

At midnight on July 2, the last of Continental's 2700 employees filed through the gates and a maintenance crew of union workers stood by as the plant went out of action. (Continental's five openhearths and 14 rolling mills are capable of furnishing 285,000 tons of steel sheet and wire rod a year.)

The company had been protected by a 30-day clause in its union contract, providing for a 1-month cooling off period before the workers would follow their fellow union members in other steel mills.

Fall of Continental left Wisconsin Steel as Chicago's sole producer of openhearth steel. Wisconsin, with three blast furnaces and 11 openhearths, is capable of producing 719,710 tons of pig annually, and 900,000 tons of steel. Workers there belong to an independent union, not affiliated with United Steel Workers of America.

Patton Tank:

Patton M48 unveiled at three points . . . Called world's best medium.

At three widely separated plants last week, the General Patton M 48 medium tank was unveiled. It was immediately heralded by the Army as the greatest medium tank in the world.

The gallant lady whose late husband gave his name to the fighting machine christened one tank at the Chrysler tank plant at Newark, Del. At the same time, other M 48 tanks were shown off at the Ford Motor Co. tank plant at Livonia, Mich., and at the Fisher Body plant at Grand Blanc, Mich.

It has a one piece cast hull with a low silhouette elliptically designed to deflect shells. It is powered by an 810 hp Ordnance-Continental V-12 engine.

Its firepower is a 90 mm gun with a "quick change" gun tube and two .50 and .30 caliber machine guns. It has a precision optical and mechanical range finder system. Its maximum speed is upwards of 35 mph.

Its Origin—The tank was conceived on paper at the Detroit Tank Arsenal. As the result of the speeded mobilization brought about by the Korean conflict, the Arsenal turned the design over to Chrysler for production engineering and pilot model construction.

Then an arrangement was initiated that was unique in military production. Chrysler was given engineering responsibility and production of T 48 tanks. (On acceptance the letter T gives way to M.)

At the same time, Chrysler was handed the job of coordinating the efforts of Ford and Fisher Body in their tank production which was also directed to T 48's.

C. C. Utz, chief engineer, ordnance development, at Chrysler; R. T. Keller, general manager of the Chrysler Delaware plant and the now Chrysler operated Arsenal in Detroit; D. H. Brown, chief engineer at the Delaware tank plant; A. C. Moore, general manager of the Ford tank division; J. A. Swing, chief engineer of the Ford tank division; S. J. Sabourin, general manager of Fisher Body's Grand Blanc plant, and B. Cotter, chief engineer at Grand Blanc were the key figures in the cooperative project.

OFF THE LINE: First permitted picture of the Army's new Patton M48 medium tanks rolling off the Chrysler Delaware Tank Plant assembly line.

Largest Order — Ford actually built its first tanks at the Highland Park plant because the partially constructed Livonia plant was gutted by fire. The new plant will be ready for production about Aug. 1. Chrysler has the biggest order for Patton tanks, over $1 billion in value. Fisher Body's contract has been increased to $474,984,000 while the Ford contract exceeds $425 million.

The Patton M 48 has the general features of the M 47 but with the greatly improved one piece cast hull and quick change gun tube.

THE BULL OF THE WOODS — By J. R. Williams

I THINK HE BUMPED HIS KNEECAP AN' FAINTED!
AN' BEIN' A FOREMAN, WE JUS' RUSHED HIM IN HERE!
YEP, IT'S PROB'LY TH' KNEE-CAP!
NOBODY THINKS OF BRINGIN' TH' GUY TO SO HE CAN SPEAK FOR HIMSELF-- THEY ALL WANT TO DO TH' TALKING!
YEH, HE MIGHT KNOW WHAT HAPPENED TO HIM-SELF--I'LL BET IT'S THE OTHER LEG!
7-11
J.R.WILLIAMS
THE HEROES
Copr. 1952 by NEA Service, Inc. T. M. Reg. U. S. Pat. Off.

...when this manufacturer* changed to TEXACO TRANSULTEX CUTTING OIL

Life span of a gear cutter was never more than 15 gears—often less—when a well-known mining machinery manufacturer was using a well-known competitive cutting oil. A Texaco Engineer, called in for consultation, surveyed the entire set-up and recommended use of *Texaco Transultex Cutting Oil*. The change was made and production per cutter life jumped up to 50 gears—an increase of more than 233%.

There were other benefits, too. With *Texaco Transultex Cutting Oil*, 0.005" less stock had to be removed on tool regrinds. The transparency of *Texaco Transultex Cutting Oil* made inspection easier, reduced rejects. Cutter costs were substantially lowered.

Whatever the metal or your method of machining it, there are *Texaco Cutting, Grinding and Soluble Oils* to enable you to do every job better, faster, and at lower cost.

Let a Texaco Lubrication Engineer help you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

*Name on request

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

Faithfully yours 50 *for Fifty Years*

Assure Steel Price Rise of $4.50 Ton

Dr. Steelman makes it definite . . . OPS Boss Arnall just talking . . . What happened to single military procurement catalog? . . . Senate group to probe depreciation—*By G. H. Baker.*

Settlement of the steel strike is now unofficially but informatively slated to include provision for "compensatory" price increases.

Dr. John R. Steelman, assistant to President Truman and director of the Office of Defense Mobilization, has finally spelled out his position on this key point.

Barring the now-remote chance that Dr. Steelman may retreat from this long-awaited promise of price relief, the steel companies still at odds with Phil Murray's union now may count on a government-approved price increase of at least $4.50 per ton. Some sources are betting the increase finally approved will be a dollar higher than that.

Just Talk—As a result of Dr. Steelman's belated but welcome acquiescence, it is now possible to discount last week's statement by Price Stabilizer Ellis Arnall that a $3 per ton increase "is all they're going to get."

(Arnall's remark came in the wake of Weirton Steel's request to OPS for a $5.50 per ton increase irrespective of "l e g a l" adjustments due under the Capehart amendment.)

Regardless of what Mr. Arnall has to say, the final decision on granting compensatory price rises to the steel companies actually rests with Dr. Steelman. As "the assistant to the President" (not to be confused with "an" assistant), Dr. Steelman unquestionably wields executive power over all Administration economic matters second only to that of Mr. Truman. When the chips are down, Mr. Arnall will have little choice but to do exactly what Dr. Steelman "advises" him to do—or get out.

Window Dressing—Despite his outburst recently against the Weirton application, Mr. Arnall already is on record (in testimony before the House Banking Committee) as stating that the Administration is willing to offer a $4.50 per ton increase to the steel companies.

The blast against Weirton may therefore be properly dismissed as window-dressing for the now well-established fiction that the Truman Administration is "holding the line" on prices and wages.

Where's Results? — M a n d a t e handed the Pentagon by the Capitol to get busy on publication of a single procurement catalog should be a boon to defense contractors, but isn't a cause for celebration among military procurement officers.

Congress charges that the Army, Navy, and Air Force never really intended to complete work on a single buying catalog. Despite frequent prodding from Congress to weed out duplicate specifications in its shopping lists, the Pentagon accomplished little for the $50 million is spent on the project.

Cheaper at Store—Take a common household item like a 40-watt light bulb. The Army, Navy, and Air Force buy hundreds of thousands of them each year. But why, Congress wants to know, does each branch of the service have to write a different set of specifications? A House Armed Services subcommittee says it could buy light bulbs, one at a time, in retail hardware stores at lower unit prices than the military pays for bulk shipments.

New law requires the cataloging program to start afresh under a director to be named by President Truman who will work directly under the Secretary of Defense.

Ease Depreciation?—A Senate committee raises new hope that currently high depreciation rates on machine tools may be eased.

The machine-tool industry and the Bureau of Internal Revenue long have disagreed as to whether or not short-term tax write-offs would increase or decrease the federal take in taxes. Lack of any proper statistical data obscures any clear-cut answer and consequently the achievement of any sound amortization policy.

Hit the Road — Current plans call for the launching of such a study early in August by the Senate Small Business Committee. The group plans to "take to the road" in an effort to find out for itself how BIR's present tax schedules are affecting use and replacement rates of all types of machinery and machine tools.

In recent months, BIR has been surprised to find tax returns from manufacturers away over expectations. It is believed that this is due —at least in part—to higher income derived from equipment and facilities which were fully amortized during World War II.

WHEN ABRASION IS THE PROBLEM...

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MOBILIZATION: Early Gains Lost

Steel strike hurts defense effort . . . Decontrol delayed . . . But Truman won't use Taft-Hartley Act . . . Industry in high gear but new goals will still be set—*By A. K. Rannells.*

As of June 30, the steel strike had cost 11 million tons of steel production; it had disrupted civilian goods output; and it had seriously slowed—and in some cases stopped—defense production.

But there is no present intention on the part of the Administration to invoke the Taft-Hartley Act to get the steel mills open. It is seizure power or else.

These points were made clear with the release of the sixth (2nd quarter 1952) quarterly report of the Office of Defense Mobilization.

Acting Mobilization Chief John R. Steelman, in releasing the report to the White House, said that a secondary effect of the strike will be the postponement of decontrol.

Earlier Gain Lost—It had been planned to free steel of CMP by first quarter 1953, along with other production and distribution controls, except for retaining military and defense priorities.

"Loss of steel output means, however, that supply will remain tight for several months longer." Steelman said, "and relaxation of controls will be delayed correspondingly . . . (production) loss has wiped out all the gain so far from the expansion program."

Second quarter production for defense shows a 20 pct gain over first quarter, according to the report, and is now 6 times the pre-Korean rate.

Jet bombers are being produced in "substantial" numbers and the M-47 tank is now being delivered at the rate of more than 300 a month.

At the same time, the report notes that production of numerous hard-to-get items is uneven, although some 120 specific items in this category have risen in delivery rate by 50 pct during the past 3 months.

Aircraft Output High — Deliveries of aircraft are now over 800 monthly, 3 times the rate of 2 years ago, figured either in number or airframe weight. This is about two-thirds of the scheduled target rate which should be reached in mid-1953.

Military construction of $8.4 billion is planned. About $6 billion worth is now under way, and will be 80 pct completed before the end of 1953. About 12 pct of the whole is now completed.

Machine tool output now exceeds net orders, the report says, with order boards showing a decline since January. Current rate of production is $100 million monthly, double that of last year.

Contracts have been placed for 17 of the 20 heavy presses planned, with orders for heavy castings and forgings needed for them placed with foreign foundries. All 20 are scheduled for delivery before the end of 1954.

More Targets Set — Expansion goals have been set for 131 separate materials, products, and facilities, with goals for 100 more now being worked out. These targets will be reached largely in 1954—but some in 1953 and others in 1955.

Steel capacity is to be boosted 22 pct from pre-Korean levels to about 120 million ingot tons. It is now at about 112 million tons.

Aluminum is to be hoisted by 115 pct. Present goals are sufficient for the immediate future but there is seen a need for still a greater increase.

"There won't be enough aluminum for both civilian and defense needs in the long run," Steelman says. "Of that we are sure—but we still don't have firm figures of actual need."

These expansion goals have been helped along by tax amortization certificates covering more than $21.3 billion. Certificates of necessity have been halted for some industries but by the time the program is completed, the report estimates, the total will have reached $27 billion.

No Loss—About $17 billion of this total will be subject to a fast tax write-off. The initial loss in taxes to the government will be about $7 billion but actually no loss in the long run.

These future estimates do not take into account the steel strike and its effect. It is estimated by Steelman that as of July 3, about 16 pct of steel capacity was or would be in production—including mills signing contracts last week.

The report smartly rapped the knuckles of Congress for "sapping the strength" of the Defense Production Act. But it admitted reluctantly that enough control power remained to "prevent serious" consequences providing no new inflationary pressures set in.

He Still Won't Use It

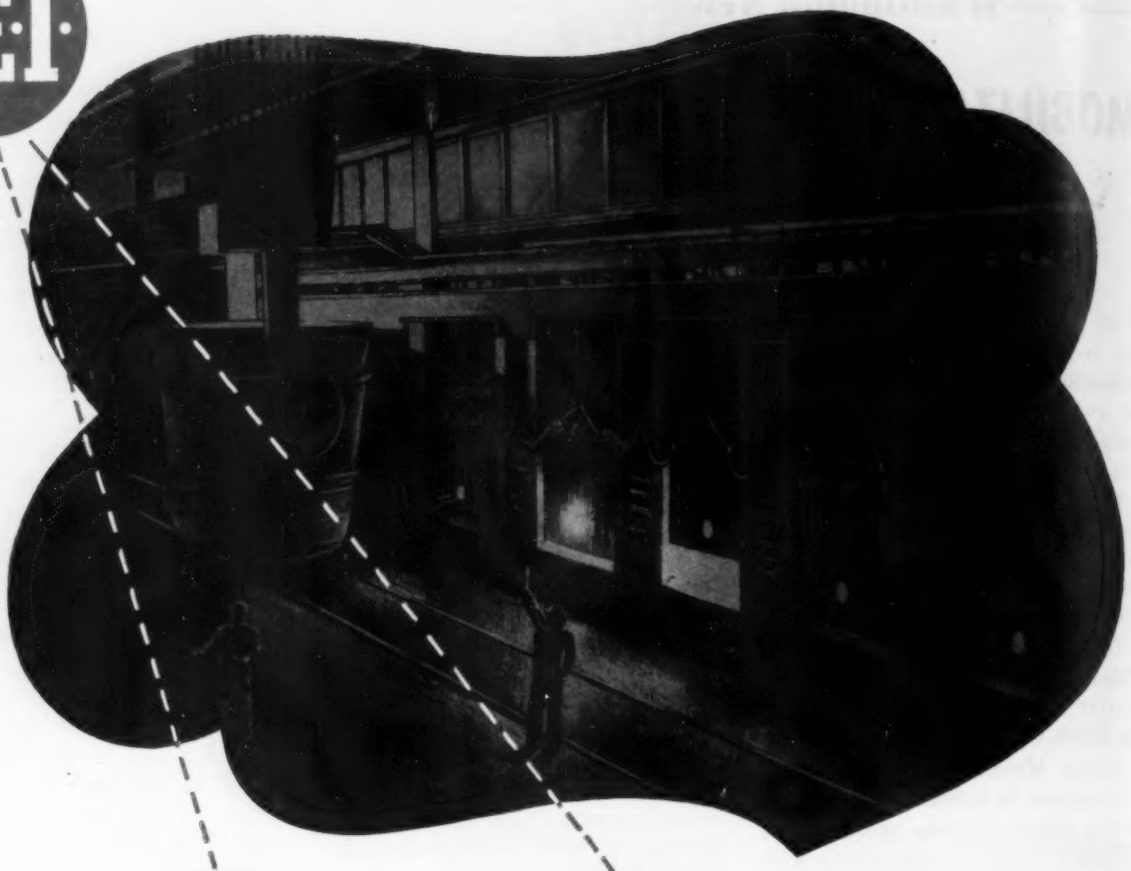
Even the remotest hopes that President Truman would use the laws at his disposal to reopen the struck steel mills appeared this week to be totally dead. Mr. Truman said:

"I understand a good many steel companies are ready to settle with the union on all issues. I understand these companies are being prevented from settling because of pressure being put on them by other steel companies.

"This appears to me to be a conspiracy against the public interest and not a labor dispute.

"In my opinion, it does not call for the use of the national emergency provisions of the Taft-Hartley Act. It calls for honest, collective bargaining between the individual companies and the union.

F·E·I·



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Full Strike Impact Hits Industry

Plants start to worry in spite of good inventories . . . Auto assembly halts . . . Attempts to move defense steel fail . . . Not a ton shipped . . . Routine repairs neglected—*By T. M. Rohan.*

The steel strike tightened its grip on a good portion of western industry last week. Manufacturing plants which previously felt secure due to good inventories began to worry in earnest.

Automobile assembly was just about completely stopped although some firms called the shutdowns extended vacations and hoped to reopen. Many low-priority firms were receiving notices from steel producers to expect no steel for the fourth quarter even in event of a quick settlement. High priority defense contractors were less worried but not optimistic.

Talks Fail—Negotiations to remove finished steel from plants broke down and finally were abandoned with not a ton removed. At Denver, the CIO and Colorado Fuel & Iron Corp., third largest producer in the West, broke off strike negotiations after 3 days.

At U. S. Steel at Pittsburg, Calif., even routine repairs are not being made. Construction of the 291,220-ton tinplate mill expansion which had been two-thirds completed has halted. Originally scheduled for operation in the fall, some parts will not be ready until early 1953.

At Geneva, Utah, a hole in the No. 2 blast furnace is still unrepaired and 3 weeks' production—about 25,000 tons of pig—will be lost after resumption of work.

Out of Work—Total unemployment in steel and steel fabrication industries in the San Francisco area was about 15,000. In the Los Angeles area 7000 in automobile plants alone and many more in small fabricating shops were idled.

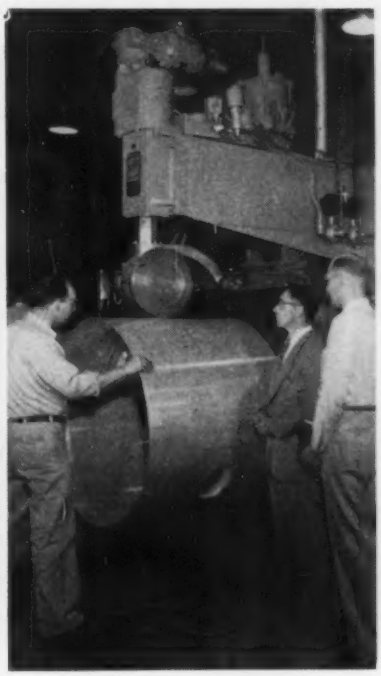
In Portland, Ore., no industries have been shut down but plants such as Hyster which makes lift trucks are closing for 2 weeks' vacations and paying workers vacation time coming.

At Seattle an importer advertised Japanese steel in the local commercial paper and despite the strike did not get a single inquiry. A small portion is reported coming in through Canada due to a shipping strike but buyers are extremely wary.

Guided Missile Plant — Over 1600 employes are already at work at the new 570,000-sq-ft guided missile plant of Hughes Aircraft Co. Ten miles south of Phoenix, Ariz., the plant was erected in the spectacular time of 30 working days—about one-third normal time.

This project, which has been surrounded with considerable secrecy, is designed for possible disassembly and re-erection at other localities. This is accomplished through field bolting instead of riveting and through use of uniform column spacing throughout the structure. A steel roof decking, insulated steel wall panels will assist speedy disassembly. Only 4 days after the last structural went up the final bolting was complete. The 2900 tons of steel used came from Bethlehem's Los Angeles plant.

Cost of the plant was originally estimated at $6 million but will reportedly cost about $11 million. At present some work is being done on electronic devices. Present plans call for employment of about 5000 workers but there is provision for 15,000. Technicians are being brought in slowly from other Hughes plants and the Hughes housing subsidiary, Sunland, is erecting homes for workers.



JUMBO: This giant Sciaky seam welder speeds Scorpion F-89 production at Northrop Aircraft, Inc.'s Hawthorne, Calif., plant. Machine can run a seam 60 in. long or around a cylinder 5 ft in diam.

New Openhearth—Pacific States Steel Co., at Niles, Calif., second largest steel producer in the West operating during the strike, announced last week start-up of its third 150-ton openhearth furnace. Milo Spaech, vice-president in charge of sales, said two old electric furnaces will be kept on standby and annual rated tonnage capacity will be 240,000. The new openhearth was installed in existing plant space.

Pacific States 2 weeks ago announced a price rise of $5 a ton on their three products, carbon structural shapes, carbon steel and reinforcing bars. New prices are, respectively (base prices, f.o.b. Niles, Calif., in cents per lb), 4.56, 4.65 and 4.65.

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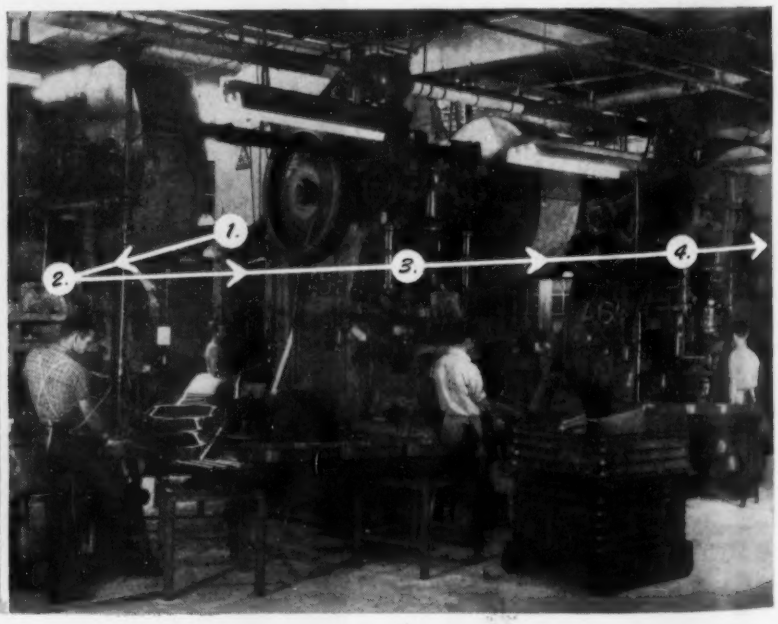

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Steel Supply Anxiety Building Up

No desperation yet but some plants may shut down next week because of U. S. strike . . . Others can weather few weeks more . . . Will strike snarl up construction?—*By F. Sanderson.*

Go into any manufacturing plant, small and large, and you can feel anxiety building up over strike-shattered steel supplies. There is a yearning for settlement to be reached in the shut down steel industry across the border. Yet the desperation stage has not been reached here.

Manufacturers are thanking their lucky stars for the substantial inventory amassed before the strike's start. Defense industry is carrying on.

In the past week to 10 days manufacturers have been knocking loud on the doors of warehouses and domestic steel mills. Results of this canvassing for steel have not been wholly satisfactory. Meanwhile, manufacturers carry on and will do so until stocks are exhausted. This may happen in 1 week for some plants and up to 6 weeks for those more fortunate.

On Schedule?—The Steel Co. of Canada, Ltd., has brought the first unit of its $50 million plant expansion program into operation. Other units are slated to come in within the next 4 months, providing there is no hitch in getting the necessary materials and equipment from the United States.

The U. S. embargo on warehouse steel has been extended to Canada and this will affect construction projects of all kinds.

Furnaces in October—Steel Co. of Canada has brought its new battery of 83 coke ovens into operation and expects to start 4 new openhearth furnaces producing in October. The new big blast furnace with rated capacity of 450,000 tons a year is scheduled to blow in before the year ends. Materials shortages may slow completion of the blast furnace.

When expansion programs of Stelco, Algoma Steel Corp., Dominion Steel & Coal Co., and other plants in Eastern Canada are completed, Canada will be much less dependent upon the United States for steel supplies.

European Steel—In the meantime with the U. S. strike in full swing larger offerings of European steel are being made on the Canadian markets, but at prices that are steadily on the jump. It is apparent that for the present Canadians are not taking much advantage of European offerings. But it is difficult to guess what will happen in the future—if consumers become desperate.

Canadian labor unions still are sitting on the fence waiting for a settlement of the strike in the States before pressing their demands.

Grain, Not Ore—Because of the American steel strike some 50 iron ore carriers on the Great Lakes have been transferred to the grain trade. Shipments of grain pouring out of Port Arthur and Fort William are double the rate for last year.

Oliver F. Burnham, of Cleveland, secretary of the Lake Carriers Assn., on his first visit to the head of the Lakes last week, said the vessels will continue in the grain trade as long as the steel strike lasts, and probably for a few days after it ends. No stocks of ore will be immediately available for shipping.

The C.N.R. ore dock at Port Arthur is continuing shipments of Atikokan iron ore at about the same rate as last year.

"What do you mean I need better employee relations? Most of them are my relations already."

Big Plans—Canada is slated for industrial expansion and spending during 1952 at the highest rate in history, according to a mid-year estimate by the Dept. of Trade and Commerce.

Public and private capital investment on expanision of services and production facilities will reach a total of $5,181,000,000. Maintenance and repair will amount to $2,014,000,000. Total is $7,195,000,000 or about $700 million above 1951.

Investment in new machinery and equipment is estimated at $2,240,000,000. Manufacturing industry is expected to spend $1,006,000,000 in expansion.

A drop in investments was noted in those industries not associated with defense production, as well as in new housing and the not so essential construction activities.

Copper's Higher—Americans are paying the new high price for Canadian copper. One Canadian producer sold copper at 35.50¢ per lb. U. S. delivered in the American market. This is 35.15¢ f.a.s. Canadian refinery, a jump of 8¢ in the past month. The amount involved in the transaction was not large, but little Canadian copper is now available.

What Happened After Korea?

Senate committee blames Washington planners for machine tool shortage . . . Indicates possible change in Congressional view . . . Outsiders make tool purchases—*By G. Elwers.*

Machine tool industry has a new friend in Washington. He is, of all things, a Democrat: Sen. Blair Moody of Michigan, who heads a Senate group investigating the machine tool shortage and its effects on the small businessman. The group has just issued a report blasting Washington officials for not taking action which might have prevented or at least reduced the machine tool shortage.

That the report blames Washington and not the industry for shortages is not in itself significant. The same conclusion has already been reached and reported by a Senate committee investigating the delay in military production. What is important is the winning of Sen. Moody. The education he received during the hearings changed his attitude toward machine tool builders from what was at least suspicion to sympathy.

Typical Attitude—Sen. Moody's original attitude, as indicated by questions he asked in the early days of the hearings, may well be typical of at least Democratic Congressmen. He seemed to have the idea that the industry was deliberately dragging its feet on production, hoping to keep business high for as long a period as possible. He expected to find skulduggery in the the cancellation of the Fisher Body contract to build Bullards. And it was difficult to convince him that profits weren't exorbitant.

The education the Senator got changed his mind. It is important because there may be others in Washington with the attitude he now has. Such men will be needed if a war or more serious defense emergency arises.

Scarcity of men in Washington who understand the machine tool industry caused the fix we're in today. Those who organized the defense effort after Korea weren't all fools and knaves; they just didn't understand. True, the industry tried to enlighten them. It presented its case for pool orders and priorities clearly and honestly. But you just can't convince a man, even by unassailable logic, if he is even slightly suspicious of your motives to begin with.

No Priority — When industry first asked for top priorities years ago and was told it was no more important than the makers of pots and pans or roller skates, the statement was not quite so stupid as it sounds. What it meant was that while industry had made a convincing presentation of its case, Washington did not dare swallow its hardship story without first hearing from the rest of industry. It couldn't just take machine tool builders' word. That's where planning was weak.

They Didn't Know—What was really inexcusable about the fiasco that kept the industry waiting a year for aid in upping its production was lack of preknowledge in Washington. It is not too surprising that men unfamiliar with the industry listened somewhat skeptically to industry's pleading. What is surprising is that it was men unfamiliar with the industry who were doing the listening. There were a few machine tool experts around, but they had no authority and weren't listened to.

Considering the vital importance of high machine tool production, fully demonstrated in World War II, it is difficult to understand why Washington wasn't ready to listen to the industry men when Korea came.

If there is a next time, there must be men already on hand in Washington who know enough to say to machine builders: "Let's get together and see what you need to start moving." Men in Congress with the knowledge Sen. Moody now has will be invaluable.

Who's Buying? — The question of who buys machine tools is not easy to answer. They cost enough so that purchase decisions are not lightly made, and are usually not entrusted to subordinates.

Warner and Swasey Co. recently traced back 20 orders to see who had made the final decision. The results were surprising, D. M. Pattison, sales vice-president, told the National Association of Industrial Advertisers recently. In eight out of 20 cases, the final decision was made by someone who was not even a full time employee of the purchasing firm.

In these cases final approval of the purchase was made by bankers or lawyers or industrialists from other firms. In the latter situation such men made the decision because they were chairmen of a board of directors' committee on capital expenditures, or had some similar authority.

The Iron Age

SALUTES

William F. Zerbe

From chem lab helper to steel vice-president, he did it the traditional American way—by his own efforts.

YES, it still happens. Coming up from the bottom is still the American pattern. And it will be as long as men like Bill Zerbe are around.

Bill was fresh out of Harrisburg, Pa., public schools in 1911 when he went to work in Central Iron & Steel Co.'s chem lab. And fresh is the word. His love of practical jokes and unending curiosity about everything connected with steel more than once got him in the cooling tank along with the tongs.

Bill worked as checker, crane operator, loader, shipper, openhearth helper and chemist. Studying chemistry and metallurgy on his own time through Pennsylvania State College Extension, he was appointed chief chemist in 1922 and chief metallurgist in 1929.

For all his interest in technology, Bill never lost touch with the men who put theory into practice. As assistant general superintendent, he negotiated Central's first contract with United Steel Workers in 1942. In the past 10 years only nine out of 411 grievances have been sent to arbitration.

Central was taken over by Barium Steel Corp. in 1946. It didn't take Barium's chairman J. A. Sisto long to spot Bill Zerbe. General manager of operations in 1947 and vice-president in charge of Central operations in 1948, Bill was also vice-president of Phoenix Steel Co., Phoenix Bridge Co. and Chester Blast Furnace, Inc., by 1950.

A double-barreled executive, he handles plant expansion and labor relations with equal success. His hobby? Steel.

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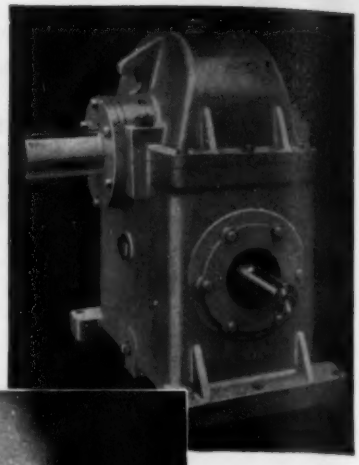

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William J. Roberts, Sr., re-elected president, TRAYLOR ENGINEERING & MFG. CO., Allentown, Pa.

Alexander R. Lindsay, named vice-president in charge of research and engineering, BUDD CO., Philadelphia; **George E. Lallou**, appointed treasurer; and **J. G. Richard Heckscher**, named secretary.

Chester H. Steel, named vice-president in charge of Western operations, ANACONDA CO., New York.

Frank L. Magee, elected a director, ALUMINUM COMPANY OF AMERICA, Pittsburgh.

L. G. Porter, elected a vice-president, BORG-WARNER INTERNATIONAL, the export trade division, Borg-Warner Corp., Chicago; and **Ray P. Johnson**, also was elected a vice-president.

Paul Corp, named a vice-president, AMERICAN METAL PRODUCTS, Detroit.

C. B. Thomas, president, Export Div., elected a vice-president of CHRYSLER CORP., Detroit.

William L. Carroll, elected treasurer and a director, WESTINGHOUSE ELECTRIC INTERNATIONAL CO., New York. He succeeds **Ivan F. Baker**, who has retired.

S. W. Fountain, elected vice-president and also appointed to the board of directors, CHICAGO TRAMRAIL CORP., Chicago.

William G. Laffer, made vice-president-operations, THE CLEVELAND GRAPHITE BRONZE CO., original equipment division.

Carl A. Benz, joins research staff as senior physicist, Chemical Plants Div., BLAW-KNOX CO., Pittsburgh.

Keith P. Rindfleisch, appointed sales vice-president, Supply Div., UNITED STATES STEEL CORP.; **Hal P. Hibbey**, becomes Chicago district manager.

Charles A. Strack, appointed head of research and testing work, Virgo Salt laboratory, Niagara Falls, N. Y., HOOKER ELECTROCHEMICAL CO.

Phillip H. McManus, elected vice-president in charge of sales, TEMPLETON, KENLY & CO., Chicago.

Wallace R. Harper, elected vice-president in charge of plate glass sales, PITTSBURGH PLATE GLASS CO., Pittsburgh; and **David G. Hill**, elected vice-president in charge of Glass Manufacturing.

Victor L. Johnson, promoted to director of purchases, SOUTHERN STATES IRON ROOFING CO., Savannah, Ga.; **Jule Petris**, named product manager, and **Francis Dasher**, becomes office manager.

Joseph S. Seville, named superintendent, REED ROLLED THREAD DIE CO., Holden, Mass.; and **George W. Lyman**, named chief engineer.

Elwood M. Keifer,, promoted to sales engineer, SNYDER TOOL & ENGINEERING CO., Detroit.

L. R. Forrest, becomes staff assistant to the works manager, Warners Plant, Linden, N. J., AMERICAN CYANAMID CO.

Robert W. Suman, appointed chief engineer, new Colmar, Pa., plant, LINK-BELT CO., Chicago; and **Norman Virkler**, named chief engineer, Philadelphia plant.

Floyd L. Greene, elected chairman of the board, GENERAL REFRACTORIES CO., Philadelphia.

ROBERT E. DWYER, elected president, Anaconda Copper Mining Co., New York.

CLYDE E. WEED, elected vice-president in charge of operations, Anaconda Copper Mining Co., New York.

LIONEL Y. GREENE, elected president, General Refractories Co., Philadelphia.

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Personnel

Continued

Sir William Griffiths, D. So., of London, England, will serve as a consultant for LEBANON STEEL FOUNDRY, Lebanon, Pa.

A. L. Foell, appointed technical director, Metals Div., ARTHUR G. McKEE & CO., Cleveland; **Merrill Cox,** named general sales manager; **J. F. Baier,** named chief engineer; and **Ben B. Frost,** named sales manager, Iron & Steel Dept.

Willard R. Kimsey, appointed assistant comptroller, KENNECOTT COPPER CORP., New York.

Joseph H. Roberts, elected chairman of the board, EDGCOMB STEEL OF NEW ENGLAND, INC., Milford, Conn.; **Joseph H. Roberts, Jr.,** elected president and treasurer; **Arthur W. Moody,** named vice-president in charge of sales; **Nils C. Erickson,** named vice-president; and **Edgar R. O'Brien,** named secretary.

Marvin O. Shrader, appointed supervisor of organic chemical research, Research & Development Dept., PITTSBURGH COKE & CHEMICAL CO., Pittsburgh.

Thomas M. Ware and **Edward D. McDougal, Jr.,** elected vice-presidents, INTERNATIONAL MINERALS & CHEMICAL CORP., Chicago; and **C. M. Edwards,** elected secretary.

Roland P. Place, elected chairman of the board, UNITED STATES RADIATOR CORP., Detroit; and **W. C. McCord,** elected president.

Eugene E. Durst, promoted to technical assistant to the manufacturing vice-president WICO ELECTRIC CO., Springfield, Mass.; and **Vincent Bagnall,** promoted to manufacturing engineer.

George N. Landis, D. E. E., appointed chief electrical engineer, newly created Electrical Dept., HYDROPRESS, INC., New York, and its Loewy Rolling Mill Div.

Herman G. Eberling, named assistant manager Plains sales division, CATERPILLAR TRACTOR CORP., Peoria, Ill.

Frank R. Lewis, appointed sales manager, Aircraft Parts Div., THE KAYNAR CO., Los Angeles.

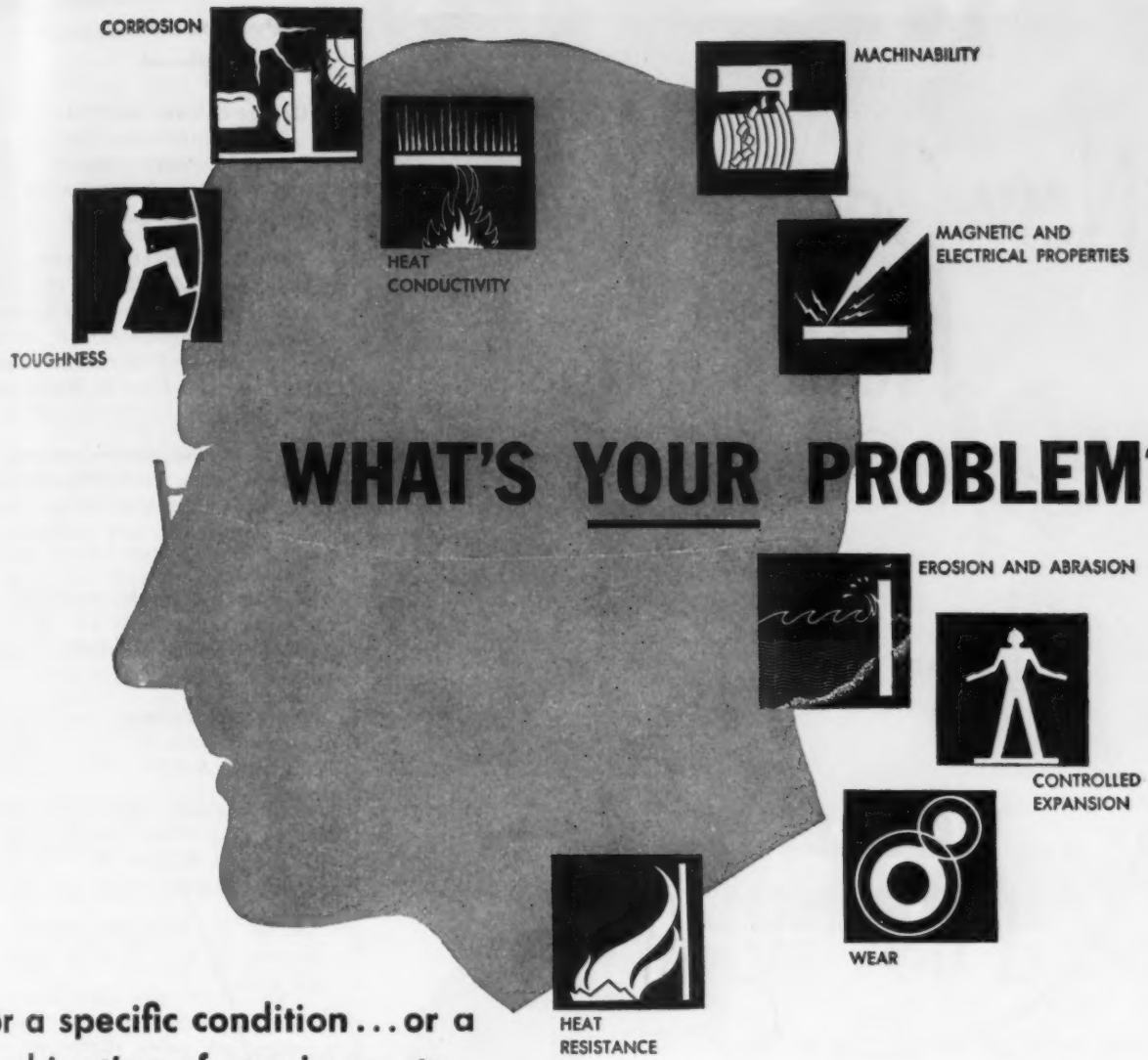
Robert C. Carruthers, appointed assistant sales manager, welding products, American Manganese Steel Div., AMERICAN BRAKE SHOE CO., Chicago Heights, Ill.

EDWARD S. McGLONE, elected executive vice-president, Anaconda Copper Mining Co., New York.

CHARLES J. NOCAR, appointed assistant to the president, E. F. Hauserman Co., Cleveland.

GORDON B. RUSSELL, appointed comptroller, Kennecott Copper Corp., New York.

THOMAS J. MOHER, appointed assistant to comptroller, Shipbuilding Div., Bethlehem Pacific Coast Steel Corp., San Francisco.



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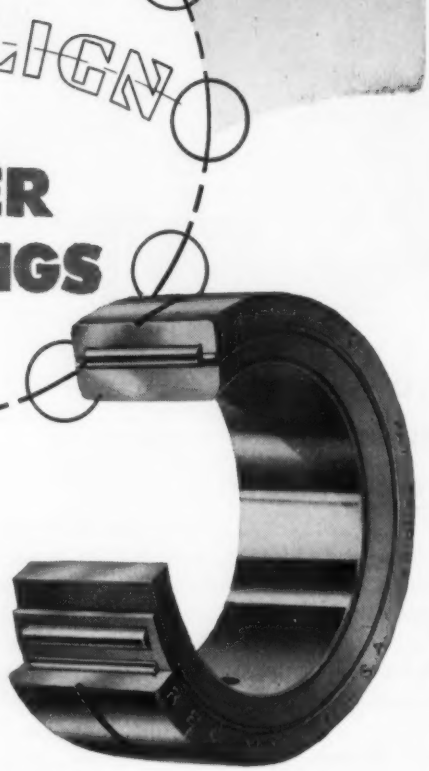

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George Gilliam and **C. J. Smolinske**, named industry sales managers, industrial division, MINNEAPOLIS-HONEYWELL REGULATOR CO., Philadelphia headquarters.

Eugene F. Eckerle, elected general manager, ALUMINUM INDUSTRIES, INC., Cincinnati; **Richard G. Tessendorf**, promoted to assistant general manager in charge of manufacturing; and **John H. Hater**, named secretary.

C. H. Kuthe, named manager, of technical sales, WOLVERINE TUBE DIV., of Calumet & Hecla Consolidated Copper Co., new technical sales unit.

Harvey W. Bush, appointed general manager, VISUAL PRODUCTION PLANNING, INC., Connellsville, Pa.

Weaver E. Falberg, appointed manager, alloy steel division, JOSEPH T. RYERSON & SON, INC., Chicago.

Paul J. Foley, appointed manager, Kansas City Office, WORTHINGTON CORP.; and **William M. Fine**, named manager, Milwaukee branch office.

Daniel H. Harkness, named sales manager, W. & L. E. GURLEY, Troy, New York.

John B. Cording, Jr., named district manager of sales, Syracuse office, LUKENS STEEL CO.

Louis J. Prior, appointed assistant general traffic manager, Pittsburgh offices, THE NATIONAL SUPPLY CO.

A. B. Wells, appointed assistant manager, Atlanta sales branch, CRUCIBLE STEEL CO. OF AMERICA; and **Paul E. Hays**, appointed assistant superintendent, River Transportation Dept.

E. L. Mitchell, appointed southwestern district manager, THE DAVEY COMPRESSOR CO.

J. P. Moore, appointed district manager, Cleveland sales office, THE ELECTRIC CONTROLLER & MFG. CO.

Robert L. Brehm, appointed assistant chief engineer, SNYDER TOOL & ENGINEERING CO., Detroit, and its subsidiary, Arthur Colton Co.

E. R. Rowe, becomes sales representative, GREAT LAKES CARBON CORP., Missouri Coke & Chemical Div., at the San Francisco offices.

Personnel

Continued

John E. Hawley, joins Research & Development Div., PENNSYLVANIA SALT MFG. CO., at the Whitemarsh Research Laboratories, Wyndmoor, Pa.

Francis J. Kinsella, appointed regional sales manager, in the Midwest, STANDARD PRESSED STEEL CO., Jenkintown, Pa.

E. W. Taylor, appointed West coast representative, S. G. TAYLOR CHAIN CO., Hammond, Ind.

N. R. Aldrich, appointed sales representative, FAGEOL HEAT MACHINE CO., Detroit.

J. Harry Evans, appointed assistant regional sales manager, WILLYS-OVERLAND MOTORS, Toledo.

John H. Johnson, named purchasing agent, CROMPTON & KNOWLES LOOM WORKS, Worcester. He succeeds **Frank E. Colesworthy** who has retired.

Don E. Hodgson, appointed secretary, THE REX OIL & CHEMICAL CO., Cleveland.

Charles B. Blanchard, appointed sales engineer, New York state territory, J. E. RHOADS & SONS; **Donald C. McClure** and **Warren A. Johnson,** become new sales engineers, Chicago branch office.

Raymond W. Gittings, appointed to the Industrial Relations Dept., DRAVO CORP., Pittsburgh.

Stanley Kramer, appointed chief applications engineer, newly formed Germanium Products Div., RADIO RECEPTOR CO., INC., Brooklyn, and **Herbert Friedman,** appointed sales engineer.

David B. Lawton, named manager, newly-planned transformer manufacturing plant, Rome, Ga., GENERAL ELECTRIC CO.

OBITUARIES

L. Norris Hall, 73, president, L. Norris Hall, Inc., Philadelphia, recently.

Raymond E. Brown, 74, consulting engineer, Heyl & Patterson, Inc., at his home in Pittsburgh, recently.

Melvin E. Haas, 45, Chicago District sales manager, G. F. Wright Steel & Wire Co., Worcester, Mass., recently.

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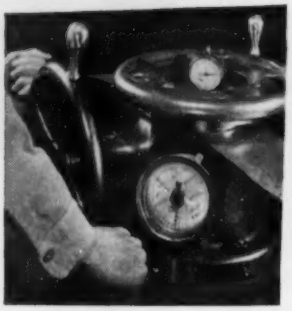

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When to skip a race—

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Technical Articles

How to use BEARING COMPONENTS Instead of complete units

By E. P. Stahl
The Garlock Packing Co.
Palmyra, N. Y.

Despite the wide range of orthodox ball and roller bearing units on the market there are times when space or other factors don't permit use of a complete bearing in a machine design. A number of applications have been developed in the automotive and other fields which use some of a bearing's components. They use either the bore or the shaft in place of the outer or inner bearing race.

Although the range of orthodox ball and roller bearings available as complete units covers most requirements, there are cases when space and other design factors prohibit the use of even light sections of complete bearing units. In cases like this it is convenient, sometimes obligatory—to use only one or more parts of an orthodox ball or roller bearing to conserve space without sacrificing load carrying capacity.

Although this practice is generally frowned upon by most bearing manufacturers and some bearing users, it is being used successfully in a number of applications. Where anti-friction qualities are required but all parts of a bearing to make an entity are not, it is often possible to omit parts of the bearing and still secure the results desired—in other words, where outer or inner races of the bearings can be omitted without sacrificing load capacity.

As most engineers know, the orthodox annular ball bearing is a self-contained unit and cannot easily be dismantled, whereas the outer race of the orthodox cylindrical roller bearing can usually be detached. However, several ball bearing assemblies with the inner ring omitted have been evolved and used satisfactorily.

Fig. 1 shows ball bearing components for a fan and pump shaft assembly used extensively in the automotive and tractor industries. In this assembly the pump and fan shaft supporting bearings are made in one simple compact unit. The accurately ground shaft has two raceways for the two rows of balls formed integrally, thereby eliminating the inner bearing rings and keeping the outside diameter correspondingly small. The outer ring of the bearing is fitted with permanent, close fitting synthetic rubber seal inserts at both ends. The bearing is packed with lubricant at the time of assembly, eliminating any need for lubricating fixtures. Another advantage of this bearing assembly is that the bearing housing can be straight through bored to a locating shoulder, requiring no facing. The advantages are obvious. Other assemblies consisting of ball bearing components are shown in Figs. 2 and 3.

In the applications described above, the outside diameters of the bearings and the pitch diameter of the ball complements may be reduced. This is desirable where low torque and high speed is required and a stronger and more compact design is desired. These by no means exhaust the possibilities of ball bearing components for machine designs, but they are fairly representative of applications of this kind.

Because races of roller bearings are separable this feature can often be exploited to condense design and reduce machining and assembly costs. Most design and product engineers know that revolving spur and idler gears are sometimes severely restricted in diameter and heavily loaded. This prohibits the use of an orthodox roller bearing large enough to support the load. In cases like this the design engineer has several alternate expedients. One is to omit the outer race of the bearing and operate the rollers directly upon the hardened and ground bore of the gear (Fig. 4). This will

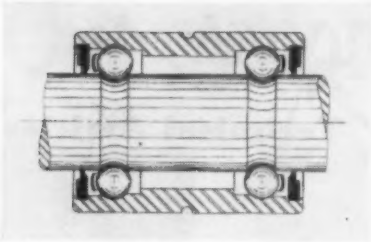


FIG. 1—Shaft substitutes for inner race of ball bearing assembly on this automotive fan and pump shaft.

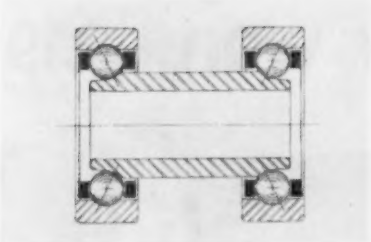


FIG. 2—Spin axis ball bearing arrangement for a gyroscope instrument dispenses with the usual inner ball race.

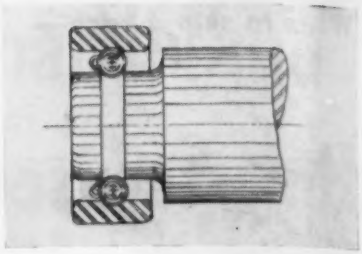


FIG. 3—Again the inner race is omitted in this miniature ball bearing assembly roller for a typewriter carriage.

"Loose roller arrangements for spur gears are not suitable at high speeds . . ."

sometimes allow the appropriate bearing to be fitted, reducing the space requirements by the required amount without reducing the load carrying capacity of the bearing.

These applications use partial bearing assemblies consisting of roller assemblies and inner races from orthodox cylindrical roller bearings. The bore of the gear must be through-hardened or case-hardened to a depth of 5/64 in., this depth depending upon the sections and the application. It must be hardened to 60-64 Rc and accurately ground.

Fig. 4, (B) shows a variant of (A). In (B), a wide spur or idler gear, two partial bearing assemblies and inner races are mounted side by side with considerable spread between the bearings to increase the rigidity and stability of the gear. As in (A) the bore of the gear supporting the rollers must be hardened and ground. In these applications the gear bores or outer tracks are ground at one setting. The spacer between the rollers in (B) is fitted after the gear bore has been finished. It is held by a split snap or expander ring.

A second method of applying roller bearings in a restricted space where spur gears are employed is shown in Fig. 5. Here two roller assemblies from orthodox roller bearings operating upon a hardened and ground shaft and gear bore are used.

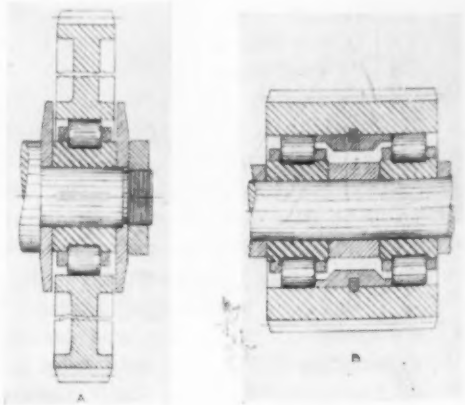
In some spur gear bearing applications where speeds are low and loads are high, it is sometimes advantageous to use only roller assemblies from orthodox roller bearings (Fig. 5).

To ensure satisfactory operation from such an arrangement certain rules must be observed. For instance, the roller diameters of the roller assemblies must be arranged to allow the proper diametrical clearances and bearing surfaces must be hardened and ground to close tolerances.

There are other spur gear applications where speeds are low and loads are high which can use the full or loose roller type of assembly from needle bearings (Fig. 6). In applications of this kind, as with those discussed in Figs. 4 and 5, the rollers and the track diameters should be so arranged as to allow the diametrical clearance figures specified by the bearing manufacturers.

It should be emphasized at this point that loose roller arrangements for spur gears are not suitable at high speeds since in the absence of cages in the bearings the rollers make direct contact with one another. Since they move in opposite directions a great deal of sliding friction is present which, at high speeds, generates a lot of heat. These spur gear assemblies are also sensitive with regard to lubrication requirements. Many spur gear applications are lubricated by oil splash from the mechanism in which they are used whereas in others lubricant is introduced through a hole in the shaft (Fig. 5). These spur gear applications are fairly representative of partial bearing uses in the automotive and tractor industries but by no means exhaust the possibilities of units of this kind.

Although the above examples are concerned with spur or idler gears using roller assemblies or loose rollers only, there are places where bearing components consisting of a roller as-



A B

FIG. 4—European designs show partial bearing assemblies in spur gears where space is definitely at a premium.

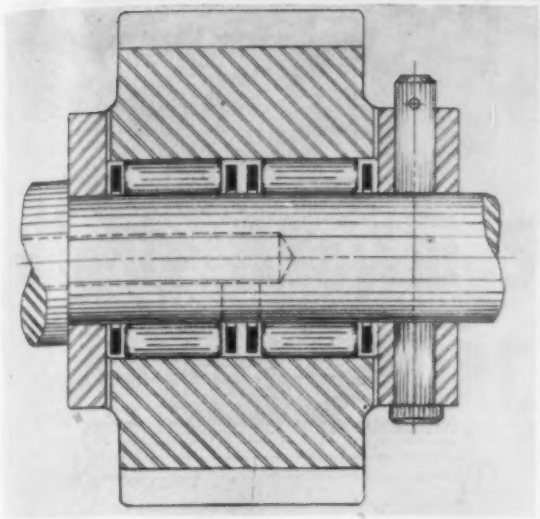


FIG. 5—Another method of applying roller bearings in a restricted space is shown on this spur gear application.

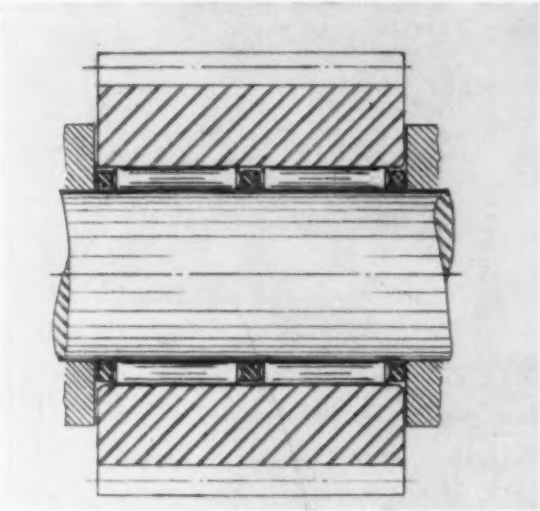


FIG. 6—Where speeds are low and loads high, this use of loose needle rollers is a good design for spur gears.

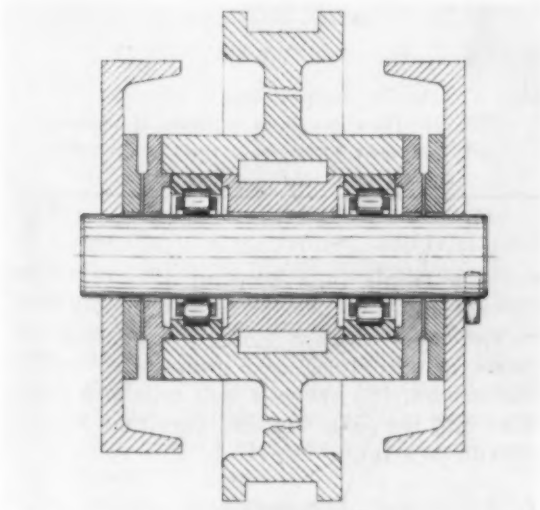


FIG. 7—Partial bearing assemblies have been used in this crane wheel. On all these applications the shafts or bores must be hardened and ground where they act as substitutes for the races normally included in such units.

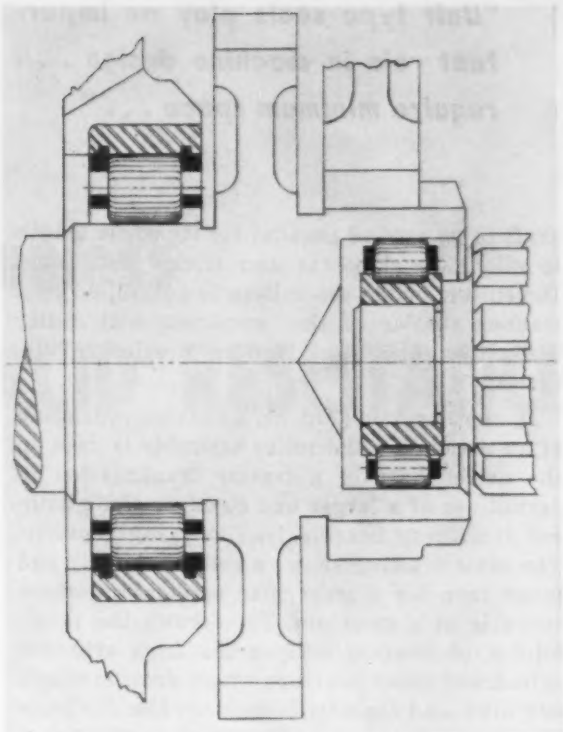


FIG. 8—This tractor transmission uses bearing components from cylindrical roller bearings to save space.

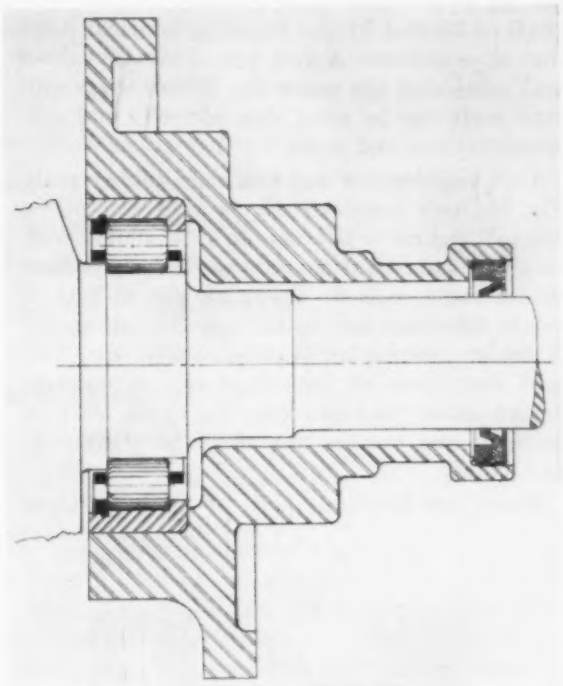


FIG. 9—Lipped cylindrical bearings at either end locate shaft in this crankshaft roller assembly and outer race.

sembly and outer race can be used advantageously. An application of this type has been used on light crane wheels (Fig. 7). It will be noted that the outer races of the bearings have two lips each for roller control allowing the

"Unit type seals play an important role in machine design . . . require minimum space . . ."

shaft to be ground parallel for its whole length to eliminate elaborate and tricky machining. Dimension inside the rollers is controlled in a manner similar to that employed with roller assemblies and loose rollers previously discussed.

In another unit (Fig. 8), a bearing consisting of an outer race and roller assembly is used on the drive shaft in a tractor transmission to permit use of a larger and stronger shaft without sacrificing bearing load carrying capacity. The same drawing shows a roller assembly and inner race for a stem gear application where space is at a premium. This shows the possibilities of bearing components from orthodox cylindrical roller bearings where great strength and high load capacity is desired; also for bearing components of high load capacity for a restricted space.

Fig. 9 shows the application of a roller assembly and outer race from a cylindrical roller bearing with a single-lipped outer race mounted on the crankshaft of a gasoline engine. The shaft is located by the lipped cylindrical bearings at either end. A unit type synthetic rubber seal completes the assembly. Where these unit type seals can be used, they simplify and condense designs and make for easy assembly.

Unit type leather and synthetic rubber seals, Fig. 10, have been extensively used with orthodox ball and roller bearings in automobiles, tractors and industrial assemblies. It is important to use these seals as shown in Fig. 9, both to retain lubricant and to exclude foreign matter in designs employing bearing components. Unit type seals play an important role in machine design since they are easy to apply, easy to demount and require minimum space radically and axially.

There are three methods of applying these unit type seals to a housing (Fig. 11), (A) shows a unit type seal press-fitted into a bearing end cover which is bolted to a housing. (B) shows a unit type seal press-fitted into a counterbore. (C) shows a unit type seal press-fitted into the same housing bore that receives a needle bearing.

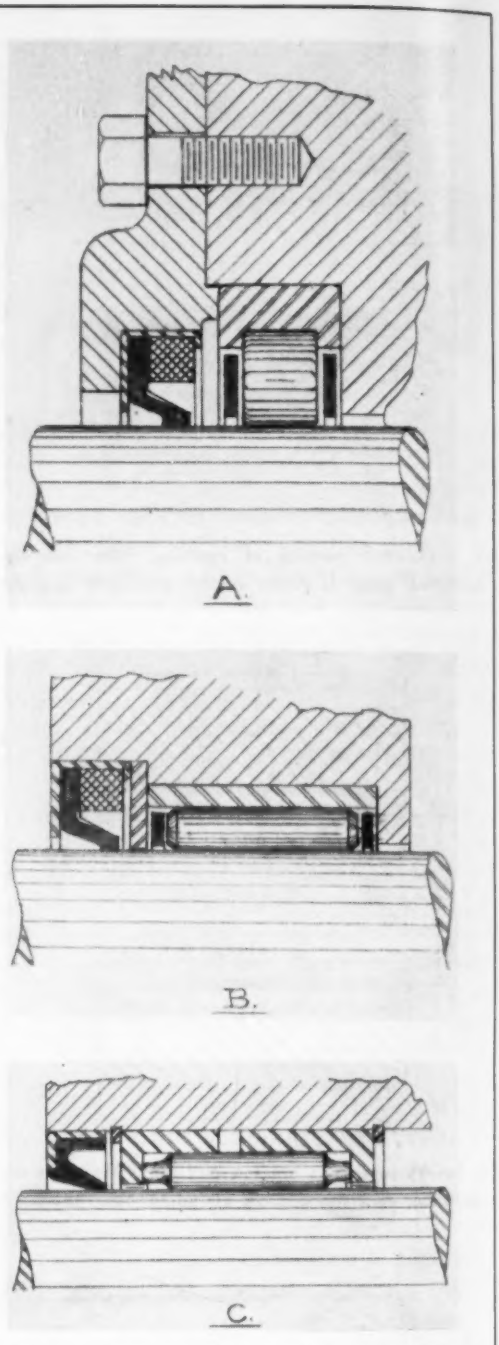


FIG. 11—There are three methods of applying unit type seals where inner races are omitted.

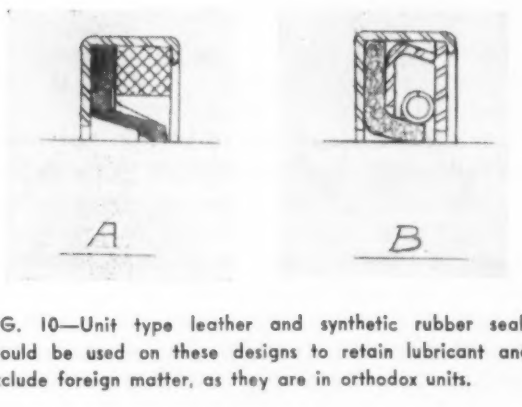


FIG. 10—Unit type leather and synthetic rubber seals should be used on these designs to retain lubricant and exclude foreign matter, as they are in orthodox units.

Acknowledgment

The author wishes to thank the following for their help in compiling data for this manuscript: Marlin-Rockwell Corp., Jamestown, N. Y.; Landis & Gyr, New York; Hyatt Bearings Div., General Motors Corp., Harrison, N. J.; American Roller Bearing Co., Pittsburgh; The Torrington Co., Torrington, Conn.; The Barden Corp., Danbury, Conn.

Help for acid systems—

Highly Alloyed Stainless HAS MORE ACID RESISTANCE

By Helmut Thielsch
Technical Assistant
Welding Research Council
New York

and

W. E. Pratt
Chemical Consultant
Worthington Corp.
Harrison, N. J.

Stainless steels highly alloyed with copper, molybdenum, nickel and chromium show excellent corrosion resistance to a wide range of sulfuric acid concentrations. These alloys can be welded. But tests show presence of sigma and the copper-rich phases may seriously reduce corrosion resistance to highly active solutions. Control of composition and annealing at temperatures between 1900° and 2100° F are recommended. Testing under service conditions with sample pieces of pipe or valves is preferred to laboratory testing.

Sulfuric acid is one of the most widely used inorganic acids employed in industrial processes. Because of its highly corrosive nature at room or at slightly elevated temperatures, common alloy and stainless steels generally cannot be used. Instead, the high-nickel alloys as Illium, Monel, Hastelloy C and D, and the special stainless steel alloys listed in Table I are more generally used, even in preference to lead in many installations.

The copper, molybdenum, high-nickel, high-chromium stainless alloys exhibit excellent corrosion resistance to a wide range of sulfuric acid concentrations, and to many other corrosive solutions.

The more important commercial alloys are listed in Table I. Although most are cast in the form of pumps, valve, etc., a considerable quantity of wrought products is also produced. Moreover, these alloys may be satisfactorily welded.[1]

These highly alloyed stainless steels are primarily austenitic. Other alloy phases also appear, however. Aside from carbide precipitation and sigma-phase formation, exposure at certain temperature ranges may cause formation of other generally copper-rich alloy phases.[2]

Some of these phases may seriously reduce corrosion resistance of the steel to highly active solutions. Their formation is generally avoided by control of compensation and/or by suitable

"It is generally desirable to anneal Cu-rich steels . . . followed by water quenching.

heat treatment of the metal under consideration. Corrosion tests are conducted in glass vessels in which the acid is maintained at constant temperature and strength. The acid is agitated mechanically or by a stream of air bubbles. Aeration may also be provided by introducing air through a porous alundum cup with provision for preventing contact of the air bubbles with the specimen. Widely different results are obtained, Fig. 1, depending on the method of conducting the test.

At room temperatures sulfuric acid concentrations up to about 85 pct (by weight), and at slightly elevated temperatures concentrations up to about 65 pct, are usually considered reducing. Higher acid concentrations tend to become strongly oxidizing.[3] In practice, sulfuric acid solutions at medium temperatures usually contain enough air in solution to permit formation and retention of a passive oxide film on alloys mentioned in Table I. For conditions involving completely deaerated sulfuric acid, alloys containing 15 to 25 pct Cr may be unsuitable.

Results* of immersion tests in air agitated sulfuric acid at 175°F (80°C) and in boiling sulfuric acid are reported in Figs. 1 and 2. Agreement among values published for several commercial alloys is relatively good compared to the corrosion-resistant properties of the common commercial stainless steels. This is apparent from the corrosion rates of Type 316 (18-8-Mo) also shown in Figs. 1 and 2.

Difference in testing conditions may cause some disagreement in published corrosion data. Considerable difference in corrosion rates is noted for specimens immersed in mildly air agitated acid, where flow across the surface is small, and the specimen dragged through the same acid at a relative acid to specimen motion of 5 fps. As long as the acid is not completely deaerated, the exact amount of air in solution makes little difference in the corrosion rate. The even distribution of quantity of oxygen over the surface of the test specimen determines the effect of the acid.

Presence of sigma phase and of Cu-rich or other alloy phases may seriously increase corrosive attack. In hot dilute, 1 to 5 pct, sulfuric acid solutions, these phases are generally not harmful. In hot strong, 40 to 80 pct, sulfuric acid solutions, presence of some of these phases can be detrimental. Additional variables are introduced by the distribution and size of the phases present. In most commercial alloys these phases are usually controlled by heat treatments.

When solutions up to 80 pct of hot sulfuric acid are used, higher corrosion rates can be observed in alloys in which the Cu-rich phase is present. Other structural phases may further increase corrosion rates in these solutions. Because of this it is generally desirable to anneal Cu-rich steels at temperatures between 1900° and 2100°F (1040° and 1150°C) for an hr or 1 hr per inch of thickness if sections are heavier than 2 in. This should be followed by water quenching since furnace or air cooling generally produce somewhat inferior corrosive properties.

In cast alloys the amount of the Cu-rich phase decreases as the Ni content is increased. For this reason, the high-Ni compositions may show

* Curves for Durimet 20 represent minimum and maximum limits. Corrosion rates fall between these curves.

TABLE I

COMMERCIAL COPPER-BEARING STAINLESS STEELS
With High Ni-Cr Content

Type Composition Cr-Ni-Mo-Cu	COMPOSITION PCT								Name	Produced By
	C	Mn	Si	Cr	Ni	Mo*	Cu	Cb		
16-35-2-2	0.07 max.	1.5 max.	1.0-1.5	14.5-17.5	34.0-37.0	2.0-2.5	2.0-2.5	....	L 32 XMC	Lebanon Steel Foundry
16-35-2-2	0.07 max.	....	....	16.0	35.0	2.0	2.0	....	Q 41	General Alloys Co.
20-24-3-2	0.07 max.	0.40-0.70	3.00-3.50	18.0-20.0	20.0-25.0	2.5-3.0	1.5-2.0	....	Worthite	Worthington Pump & Mach. Corp.
20-25-3-1	0.07 max.	....	....	20.0	25.0	3.0	1.0	....	L 33	Lebanon Steel Foundry
19-29-3-2	0.07 max.	....	....	19.0	29.0	3.0	2.0	....	Q 81	General Alloys Co.
20-29-2-3	0.07 max.	1.5 max.	2.0-2.5	19.0-22.0	27.5-30.5	1.5-2.0	2.75-3.25	....	Q 85	General Alloys Co.
20-29-2-3	0.07 max.	1.5 max.	2.0-2.5	19.0-22.0	27.5-30.5	1.5-2.0	2.75-3.25	....	L 34-a	Lebanon Steel Foundry
20-29-3-2	0.07 max.	0.80	1.0	20.0	29.0	2.75	....	....	Durimet 20	Duriron Co.
20-29-3-4	0.07 max.	....	1.0	20.0	29.0	2.0 min.	3.0 min.	....	Ircamet	Ingersoll-Rand
20-29-3-4	0.07 max.	0.75	1.5 max.	19.0-21.0	28.0-30.0	2.0-3.0	3.5-4.5	....	Aloyco 20	Alloy Steel Products Co.
								0.75-1.1	Carpenter 20 Cb.	Carpenter Steel Co.
20-29-3-4	0.07 max.	1.5 max.	0.75-1.25	19.0-22.0	27.5-30.5	2.25-2.75	4.0-4.5	....	L 34	Lebanon Steel Foundry
20-29-3-4	0.07 max.	....	1.0	20.0	29.0	3.5	4.5	....	FA 20	Cooper Alloy Foundry
25-20-2-3	0.07 max.	....	1.0	25.0	20.0	2.0	3.0	....	21 c	Cooper Alloy Foundry
25-20-3-3	0.07 max.	0.75	1.0	25.0	20.0	3.0	2.75	....	Aloyco 35	Alloy Steel Products Co.
25-20-3-3	0.07 max.	0.75	3.0	25.0	20.0	3.0	2.75	....	Aloyco 37	Alloy Steel Products Co.

* Emergency molybdenum limit: 2.5 pct max.

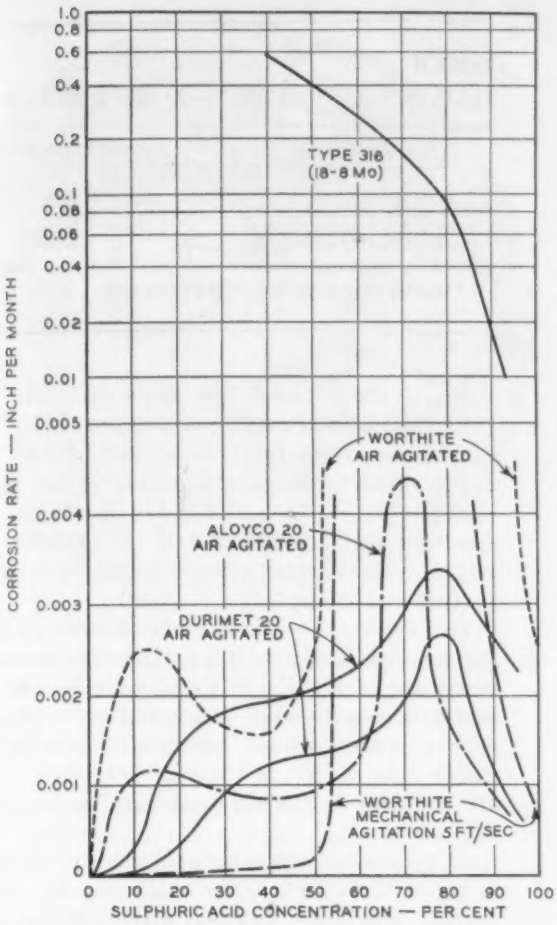

CORROSION RATE — INCH PER MONTH
SULPHURIC ACID CONCENTRATION — PER CENT
TYPE 316 (18-8 Mo)
WORTHITE AIR AGITATED
ALOYCO 20 AIR AGITATED
DURIMET 20 AIR AGITATED
WORTHITE MECHANICAL AGITATION 5 FT/SEC

FIG. 1—Corrosion rates of commercial copper-bearing stainless steels in sulfuric acid at 176° F (80°C).[6, 9, 10, 11]

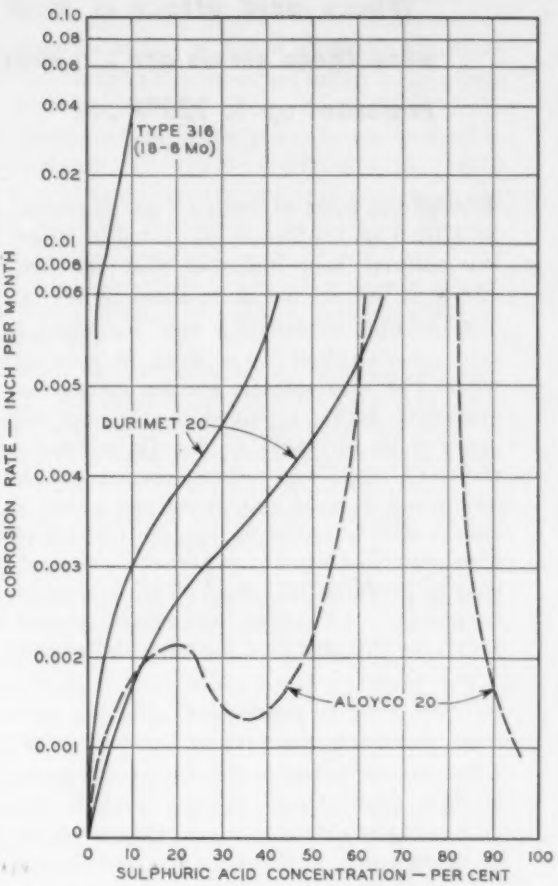


FIG. 2—Corrosion rates of commercial copper-bearing stainless steels in boiling sulfuric acid.[9, 10, 11]

slightly superior corrosion resistance in severe sulfuric acid tests.

From 1 and 3 pct Mo increases the corrosion resistance of the Cu-bearing stainless steels to sulfuric acid. Depending upon the Ni content, however, no particular advantage seems to be gained with a Mo content above 2 to 2½ pct.

Silicon content is dictated by foundry or rolling mill practice as much as by corrosion resistance. In certain environments, a Si content of 2 to 4 pct may explain superior corrosion resistance over alloys with 1.0 pct Si max. The reverse is noted, Fig. 1, in the relatively hot, medium-to-high concentration range where higher Si content is detrimental to sulfuric acid resistance.

Since Si and Mo promote sigmaphase formation between about 1050° and 1700°F (565° and 925°C), the combined Si-Mo content is usually adjusted to minimize sigma formation. Alloys should be high either in Si or Mo—preferably Mo.

In many sulfuric acid applications presence of a small amount of the sigma phase in 2 to 4 pct Si alloys does not seem to be detrimental. But in unusually severe testing and service environments the sigma constituent may be responsible for increased corrosion rates.

The role of Cu does not seem to be clearly understood. It has been stated[4] that in these highly alloyed stainless steels Cu seems to lose its bene-

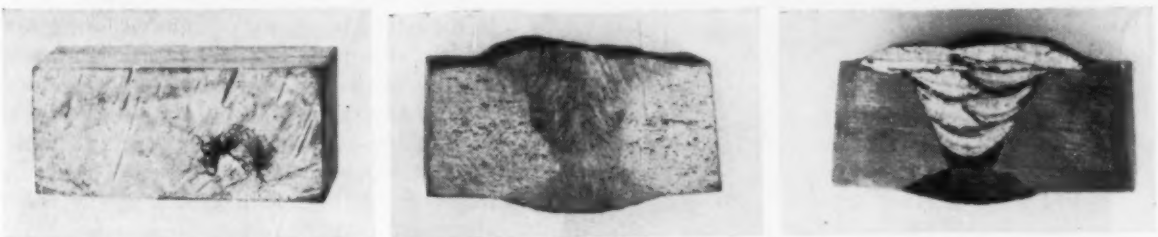


FIG. 3—Local copper deposition and pitting of stainless alloys is shown after 48-hr immersion in 10 pct sulfuric acid. A shows pitting on a specimen of 20Cr-29Ni-2Mo-3Cu alloy. B shows the same alloy welded with 20Cr-29Ni-2Mo-3Cu weld metal. Specimen at C shows 25Cr-20Ni copper-free weld metal in a 20Cr-29Ni-2Mo-3Cu cast steel.

"Where acid attack is most severe these steels are . . . usefully resistant up to 120°F . . ."

ficial effects when exceeding 3 pct. However, data by Miller[5] on Cu-free alloys tested in 10 pct boiling sulfuric acid indicated that the beneficial effects of Cu increase up to about 13 pct Cu.

A possible explanation may be found in the acid concentration. In a weak or cold solution where the acid sets in a reducing manner the protective action provided by Cu may well improve with increases in the Cu content up to about 13 pct. Under severe testing and service conditions at acid concentrations above 50 pct and/or boiling temperatures, the Cu rich phases, which readily form at the higher Cu content, may lead to preferential attack. This is particularly true since at the higher concentrations and temperatures the acid becomes essentially oxidizing.

The tendency for Cu dissolved, Fig. 3, from stainless steel to precipitate, affecting corrosion rates, has been observed in laboratory tests.

So far this behavior has not been encountered in field applications. Testing periods showing high corrosion rates owing to Cu deposition may be disregarded. Differences between these conditions may depend on solution volume.[6]

Heat treatments or exposure at about 1200°F (650°C) are detrimental to alloys which readily form the sigma phase. Precipitation of intergranular carbides and of a Cu-rich phase at these temperatures may also increase the corrosive attack in strong acid solutions.

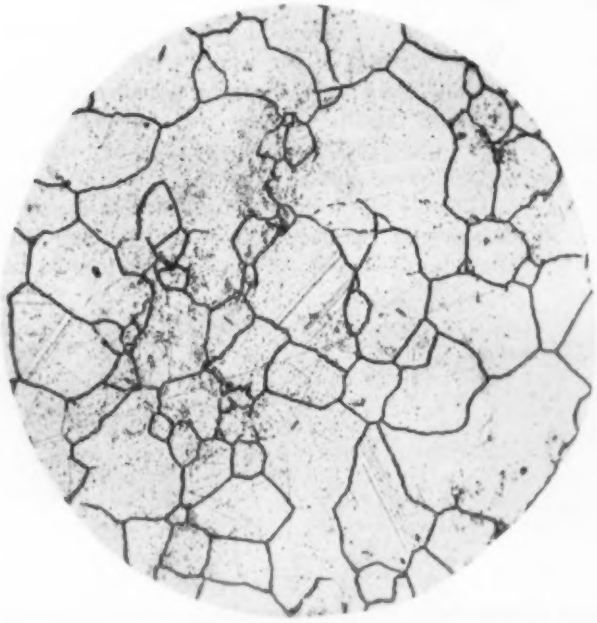


FIG. 4—Effects of sensitizing wrought 20Cr-23Ni-3Mo-2Cu stainless steel 8 hr at 1200°F and furnace cooling. 100X.

TABLE II

TESTS RESULTS ON 20CR—23 NI—3 MO—2 CU*

Test Condition	Corrosion Rate, in. per month
10 pct H_2SO_4	0.0020
10 pct H_2SO_4 + 0.5 pct $Fe_2(SO_4)_3$	0.00015
10 pct H_2SO_4 + 5.0 pct $Fe_2(SO_4)_3$	0.00010
10 pct H_2SO_4 + 0.1 pct Na_2CrO_4	0.00003

* In boiling 10 pct H_2SO_4 with added oxidizing salts.

Fig. 4 shows the etched grain structure of a 20Cr-23Ni-3Mo-2Cu alloy containing about 3 pct Si after exposure for 8 hr at 1200°F (650°C). Fig. 5 shows the same specimen after test for 24 hrs in 10 pct sulfuric acid at 176°F. (80°C). The specimen had completely lost its metallic ring and individual grains actually dislodged from the surface during the test.

Test results show these highly alloyed Cu bearing stainless steels exhibit satisfactory corrosion resistance at 175°F (80°C) to sulfuric acid concentrations up to 50 to 56 pct and above 85 to 90 pct. In concentrations between 65 and 85 pct, where acid attack is most severe, these steels are considered usefully resistant up to 120°F (50°C).

At boiling temperatures acid concentrations up to about 10 to 20 pct may ordinarily be used in contact with these stainless steels. However, in certain applications stronger acid concentrations have been used without indications of excessive attack. Permissible maximum temperatures depend upon conditions such as the amount of corrosion that can be tolerated during the expected service life of the part,* the effects of other solutions or substances in the sulfuric acid, aeration, mechanical velocity of the liquid, etc.

No one composition is superior to all others in every environment. It is usually advisable in critically corrosive applications to perform tests

* For valve applications a material should exhibit corrosion rates of less than 0.0004 in. per month.

under service conditions. Best results are obtained when it is possible to install a pump, valve, or section of pipe, depending on the proposed application.

Since most of the sulfuric acid solutions used in industrial processes contain various other substances such as tars, oils, hydrocarbons, nitric or nitrous acids, sulfate salts, halides, etc., it is usually advisable to test the stainless alloy within actual pilot plants or commercia installations. suitable test coupons generally can be readily obtained from the manufacturer of the respective alloys.

Sulfuric acid, usually has some air (oxygen) in solution and hence has an oxidizing capacity. In completely deaerated solutions unusual corrosion rates may sometimes be observed in certain environments, particularly when the stain-

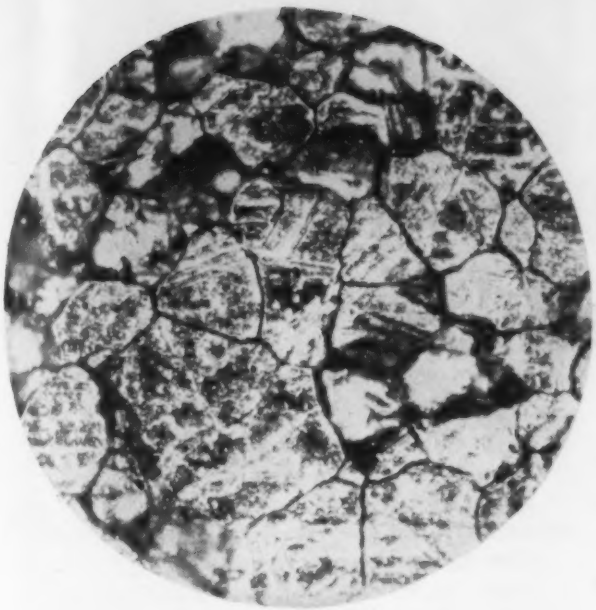


FIG. 5—Complete grains dropped out during test of wrought 20Cr-23Ni-3Mo-2Cu stainless. Specimen was sensitized 8 hr at 1200°F (650°C), furnace cooled and tested for 24 hr in 10 pct H_2SO_4 at 176°F (80°C). Agitated at 5 fps. 100X.

less steel has become active (depassivated) and is in contact with another, more noble metal. For example, at 160°F (70°C) deaerated "black acid" (about 50 pct sulfuric acid) was 244 times as corrosive as aerated acid.[7]

Damage under such conditions is usually caused by galvanic action on the activated stainless alloy which is related to its high position in the electromotive series as compared with lead which is commonly used.[8] Insulation from the lead usually permits stainless steel to be used. Reaeration is desirable when insulation is not needed because of repassivation of the alloy. This causes the alloy to become cathodic in relation to lead.

Repassivation may also be accomplished by addition of oxidizing agents which lower corrosion rates as shown in Table II. While potential readings on the alloy were not taken in conjunction with these tests, it can be assumed from other tests that the potentials referred to a saturated calomel cell would vary from about —0.15 to +0.75 v. Concurrently lead would show an apposite tendency, becoming less noble as the oxidizing capacity increased, and would vary from about +0.15 to —0.45 v. The alloy would change from being anodic to lead to being highly cathodic to lead.[8]

Another example of a highly reducing environment is sulfurous acid (H_2SO_3) to which these alloys are generally almost perfectly resistant at all concentrations and temperatures. The alloys retain their passive state in these environments. However, a mixture of the two acids H_2SO_3 and H_2SO_4, activates these steels severely.

The authors wish to express their appreciation to E. G. Holmber, Alloy Steel Products Co.; and W. A. Luce, Duriron Co., for valuable and stimulating suggestions.

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[5] J. L. Miller, "An Investigation of Certain Corrosion-Resistant Steels," Carnegie Scholarship Memoirs (The Iron and Steel Institute), 21, 111-127, 1932.

[6] DeLong, W. B., Private Communication, E. I. du Pont de Nemours & Co., Wilmington, Del.

[7] W. E. Pratt, "Effects of Oxygen Exhaustion from Corrosive Solutions on High-Nickel-Chrome-Molybdenum Steels," Trans. Electrochem. Soc., 86, 203-229, 1944.

[8] W. E. Pratt and E. T. Collinsworth, Jr., "Galvanic Action Between Lead, Worthite and Other Acid-Resistant Alloys in Sulfuric Acid," Corrosion, 5, 39-44, 1949.

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Brazing alloy gives tight, strong joints

More efficient brazing of copper, brass and bronze with a new copper-phosphorous-silver alloy, Phos-Silver, available from Westinghouse Electric Corp. Extreme fluidity and good wetting properties enable the new alloy to more rapidly penetrate tight-fitting joints and to form strong ductile bonds.

The alloy can be used with common brazing methods for brazing on copper or copper alloys, and is suited for applications where brazing temperatures are critical. On heavy sections that absorb large quantities of heat, its low brazing temperature, 1225° to 1275°F, substantially reduces brazing time. On fine work or low melting brass, where there is danger of overheating, it provides a margin of safety. No flux is needed in copper-to-copper brazing.

Typical uses are found in assembly of refrigerating and air conditioning equipment, motors and transformers and heat exchangers and plumbing installations.

STRONG DUCTILE BONDS are made with Cu-P-Ag brazing alloy recently developed by Westinghouse.

Molding a future—

REINFORCED PLASTICS: Industry tries them

By Harry Raech
President
Dynakon Corp.
Cleveland

Glass reinforced plastics are arousing strong interest as a new structural material. Their unusual physical properties include high strength with low weight, high impact resistance and dimensional stability. They are resistant to corrosion and many chemicals and show good dielectric properties. In some cases the reinforced plastics are replacing metals with production economies. Twenty-two parts which went into an aluminum basket washer were cut to four by using reinforced plastics. The material's low thermal conductivity makes it especially useful in refrigerators. The Navy is developing a 125-ft minesweeper. Intricate duct systems for aircraft, and Arctic sleds for the Army are other applications.

Glass reinforced plastics, combining unusual physical properties, are finding continually wider application in civilian and military production as a structural material. They possess high strength with low weight; high impact resistance and dimensional stability; resistance to corrosion and chemicals; good dielectric properties and transparency to ultra high frequency impulses.

Generally speaking, where many thousands or millions of pieces can be stamped or otherwise fabricated in metal, the metal will prevail today over reinforced plastics, on an economic basis. Great progress is being made, both in molding materials and equipment, to more efficiently mass-produce reinforced plastics.

Many manufacturers, however, temporarily

FIG. 1—Basket washer made from reinforced plastics helped cut machining and tooling costs. Four parts replaced 22.

FIG. 2—Railroad tie plates now being developed demonstrate material's ability to absorb blows without deforming.

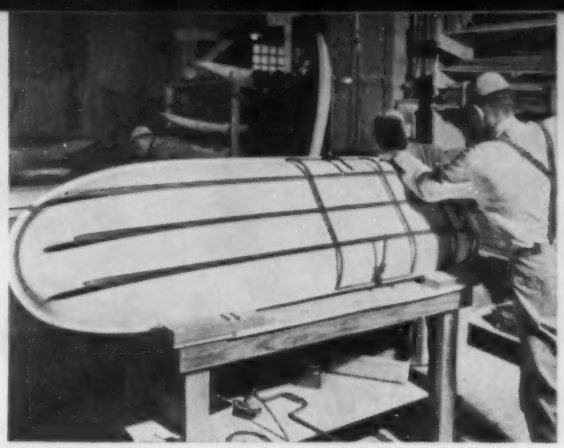

FIG. 3—Low thermal conductivity plus low weight influenced Army selection of reinforced plastics for Arctic sled.

switching from hard-to-get materials to reinforced plastics have found the new material more satisfactory than the one it superseded.

The economics of reinforced plastics often can be as favorable as their outstanding properties. A notable example is the basket washer made by Apex Electrical Mfg. Co. The washer basket, Fig. 1, is a 2-piece nesting molding, 2 ft in diam and 12 in. deep. Weight in reinforced plastics is 14 lb. Original design called for a fabricated assembly of numerous aluminum stampings, some requiring several progressive dies. By the change, the number of parts was reduced from 22 to four, and the number of dies to two. Cost was cut 50 pct. In addition, critical aluminum was released for other applications and the metalworking tools were available for use on other equipment.

Reinforced plastics have both strength and toughness. Railroad tie plates, Fig. 2, now being developed, indicate the excellent impact and compressive value. Ability to absorb blows without permanent denting or distortion exceeds metals. The full impact of locomotive and freight car pounding must be carried by the plate and transmitted through to the tie and thence to the ground.

For some military uses, strength at low temperatures is of paramount importance. Carbon steel and most metals are brittle below 0°F. Glass-reinforced plastics, however, develop higher impact at lower temperatures. These properties, plus low weight, influenced the Army's selection of reinforced plastics for Arctic sleds, Fig. 3. These sleds have a greater strength for weight ratio than is possible with other materials. Low thermal conductivity minimizes dangers of frostbite through contact with the skin.

The low heat transmission of reinforced plastics has been put to work in appliances. Refrigerator shells are coupled to the food compartment by a channel-shaped gusset, previously made of steel. Because of the higher heat conduction of the metal, cold drained off rapidly to the case and dissipated to the atmosphere. Gussets molded of reinforced plastics, Fig. 4, are now used on several makes of refrigerators. Also used in refrigerators, because of low thermal conductivity and strength, are strike plates which absorb the shock of doors slamming. A third use is for corrosion-resistant drip pans.

For the chemical process and petroleum industries, the reinforced plastics offer resistance to corrosive attack by many chemicals and acids and compete favorably costwise with other materials. Uses include petroleum truck tanks, chemical ware, plating tanks, piping, trays, and battery cases.

The aircraft industry, pioneer in development of reinforced plastics, is a substantial user of the material, notably in applications where the high strength-low weight ratio is important. Applications include radomes, fins, duct work, Fig. 5, and window frames.

Because color can be pigmented into the resin, reinforced plastics frequently afford production savings by eliminating finishing.

FIG. 4—Strike plates and gussets used in electric refrigerators prevent passage of heat to outer shell of box.

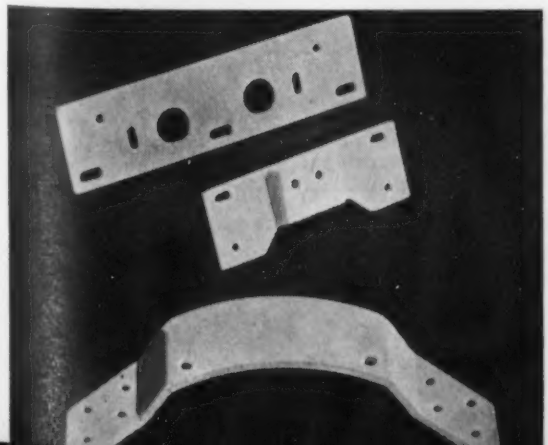

FIG. 5—Aircraft duct system was built from reinforced plastics. Other applications: radomes, fins, window frames.

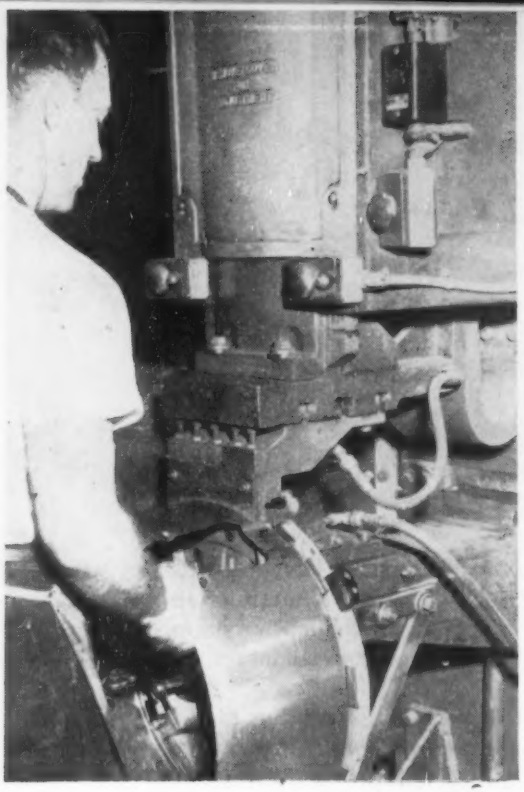

FIG. 1—Assembling base plate to washing machine frame ring. Vertical indexing fixture turns 180° between two sets of projection welds, and also moves axially to get work between dies.

SPECIAL FIXTURES speed sheetmetal fabrication

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Fabrication of laundry equipment at Whirlpool Corp. is speeded by cleverly-designed fixtures for projection welding. High-quality work is done with maximum economy and mininum labor. Some projection jobs involve unusual features. Most are standard resistance welding machines, but one unit is a special new expansion gun welder.

By far the larger part of assembly work on the sheet steel parts of home laundry equipment manufactured in exceptionally large quantities by the Whirlpool Corporation, St. Joseph, Mich., is done on various types of resisting welding machines. Many of these are standard units but nearly all have special fixtures that not only expedite the work but help to insure welds of excellent quality.

Largest volume is attained on washing machines but clothes dryers and ironers are also manufactured in quantity. This warrants much special tooling, not only in fixtures for welding, but in stamping dies, many of which produce projections that help to insure rapid welding of high quality.

Typical of sheet steel components assembled largely by projection and spot welds is the main frame, including the legs, for washing machines. A major component of this frame is a base ring that is rolled from strip stock. An oblong base plate having rounded flanged ends is projection welded inside this ring in the setup shown in Fig. 1. There are eight projections in each flange turned up on the ends of the plate.

Before welding, the plate is set over lugs against a circular vertical dial of the fixture and locked by a toggle clamp. The dial can slide axially as well as rotate on a central spindle below the lower horn of a 300-kva Federal welder. When so locked, the work and dial are moved axially inward and indexed to position to make one set of eight projection welds as the die is closed.

As soon as the dies open, the fixture is pulled axially forward, turned 180°, and then moved inward again to make a second set of 8 welds. In this setup, one man can weld 150 assemblies an hour, including the loading and unloading of the fixture. Slots in the dial fit over a fixed lug in hand indexing and insure correct location for each weld.

Unusual in several respects and remarkably fast is the setup for fastening legs to the base ring of the frame. This ring has a curved vertical section and each leg is of channel section. Edges of the channel are curved to fit the ring contour but each edge has eight projections that can be seen clearly in Fig. 2. These projections are not dome shape blisters, such as form most weld projections in sheet steel. Instead, they are parts of the flange edges which are trimmed in a cam die to form rounded points. The leg is one gage heavier than the ring so that the projections do not burn off before the welds are made.

In the ring, slots are pierced radially so that one comes under the center of each leg. These slots are used to locate the ring on the lower horn of the die. A leg is placed above the ring with the end farthest from the operator against a back stop and over a centering support just below the upper die. This upper die has come side float on a rubber mounting and helps to center the leg when the die closes to make the welds.

As soon as one set of welds is made and the die opens, the operator lifts the assembly off the locating lug, turns the ring to locate on the next slot, inserts a leg and makes the next set of welds. In designs having three legs, about 115 assemblies an hour are produced. With 4-leg designs, production averages 100 assemblies an hour. Four 300-kva Federal welders, equipped with synchronous timing controls and phase shift heat controls are used on this job. Allowing for some down time, they produce up to 2000 assemblies per 8-hr day.

Clutch control lever and hub assembly involves joining a pierced and formed stamping of channel section to a hub of much heavier section produced on a screw machine. A boss on the inner end of the hub fits one of the holes pierced in the stamping. Arranged radially around the hole are four projections, each about ⅛ in. long. Before welding, the edge at the OD of the hub rests at the center of each projection when the hub boss is placed in the hole.

Both electrodes are circular and of 1¼-in. diam but the upper one has a hole that clears the boss of the hub and bears on the metal around the hub boss. The lower electrode is drilled out for a 7/16-in. diam pin of hard fiber. This enters the hub hole and centers the hub when it is set in place with the stamping above it. When the die closes, the hub OD is pressed into the four upward projections as the welds are made and, when welded, the hub step is flush with the lower face of the stamping. About 220 of these assemblies are produced an hour.

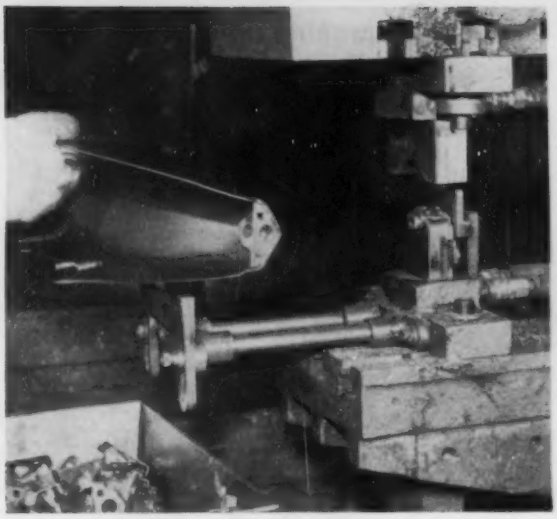

FIG. 3—Setup used to join caster sockets to washer legs. Sockets are stamped with 4 projections on each of two surfaces forming a V. Adjustable outrigger helps support leg.

Typical of many other projection welding setups is that in Fig. 3 for fastening caster sockets to washing machine legs, the operation being performed before legs are welded to frame rings. Socket stampings are formed to fit the end of the leg and the welds are made at four projections on each of two faces of a V-shaped portion that fits the lower die.

In the upper die is a mating V. When the die closes, the welds are made in succession even though the pressure on the projections is at an angle to vertical die motion. An adjustable extension supports the outer ends of the legs and helps hold each leg in correct position. This job is done in a 300-kva Federal welder at the rate of about 400 legs an hour.

Recently put into use for welding what is

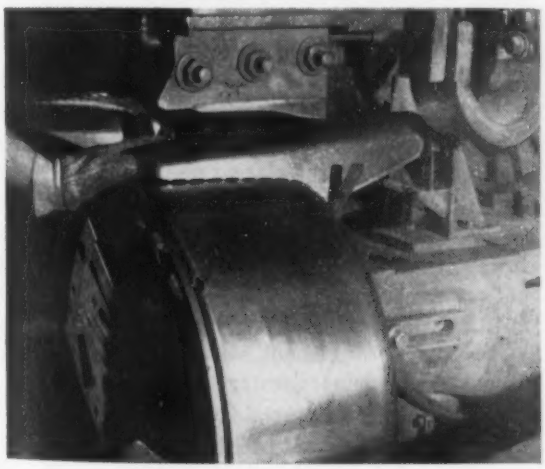

FIG. 2—In fastening legs to base rings, 16 welds are made at one time. Slots in base ring, one of which shows at bottom center, locate ring while upper die centers leg.

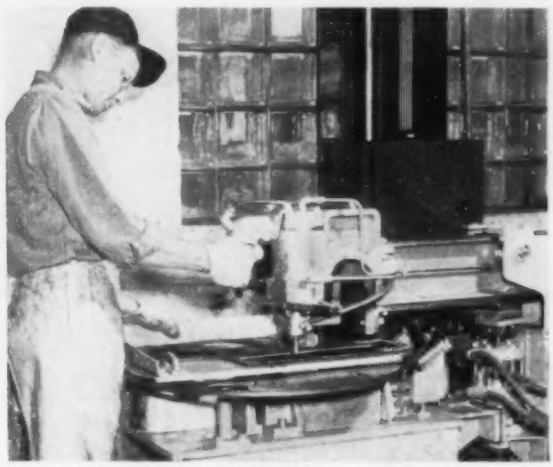

FIG. 4—Expansion gun welder, supported on sliding and pivoting arm, makes 50 spot welds in rapid succession in fabricating ironer bulkhead. Operator follows template.

"This machine will take the place of four conventional guns and two rocker arm welders . . ."

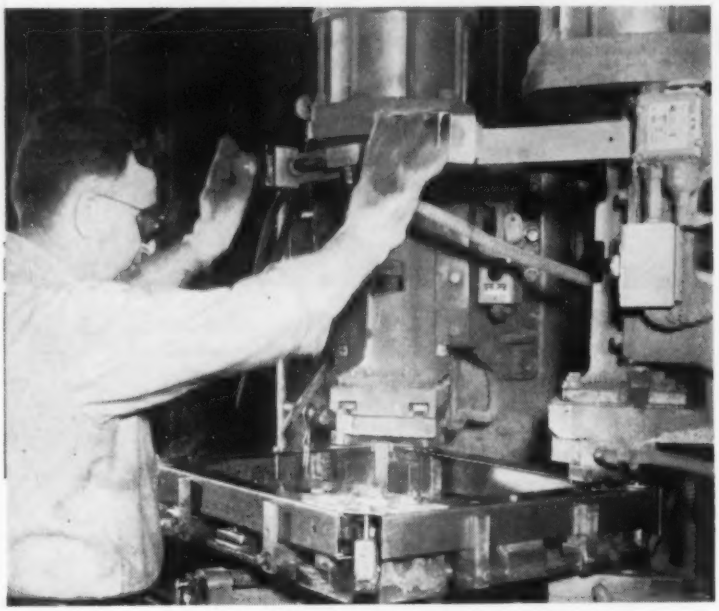

FIG. 5—Clamping fixture locks together 4 side angles and 4 gusset plates for welding. Fixture moves in and out on a slide, and is turned 180° to weld two gussets at a time.

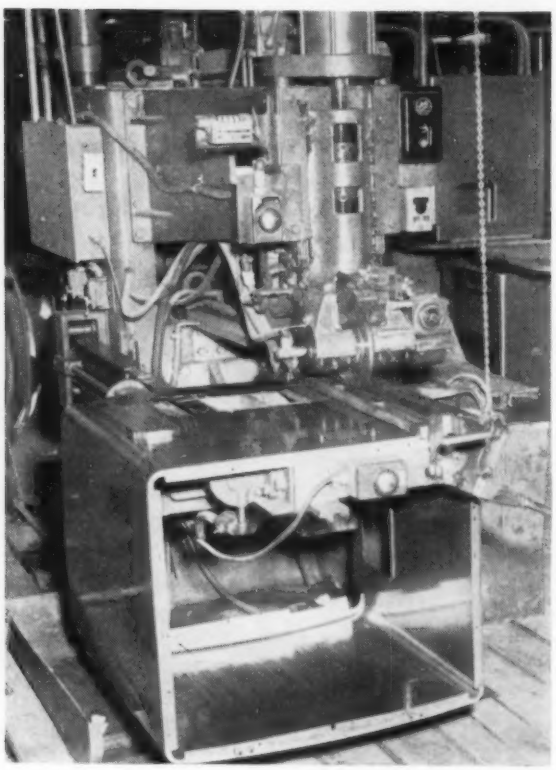

FIG. 6—Seam welder makes roller-spot weld along 30-in. overlap of automatic washer wraparound which forms side walls of the washer cabinet. Roller hub is water cooled.

known as a bulkhead assembly for an ironer is a new type of Federal expansion gun welder, shown closeup in Fig. 4. In this machine, the gun is supported on the end of a horizontal beam mounted in rollers so that it can be moved toward and away from the operator quite easily. The roller supports are in a frame mounted on a vertical pivot, so the gun can also be moved from side to side.

About 50 spot welds are made per assembly, spaced about 2 in. apart. Their pattern is controlled by an insulated template having side guides for the upper or gun electrode, work being supported on a table with the template above the work. There is a pistol grip for the operator's right hand by which he moves the electrode along the template guides.

Each time the trigger is pulled, an air plunger in the head forces the electrode down to make a spot weld. Another plunger below a bus bar under the beam forces a contact upward to complete the circuit and then retracts to break it. This contact is directly above the pivot and clears the bus when off.

It is expected that, with one man, this machine will take the place of four conventional guns and two rocker arm welders requiring a total of six operators and much shifting of the work pieces between operations.

Oblong bases for automatic washers are assemblies of four angle shape stampings joined at each corner by a stamped gusset plate. Each plate has a stiffening bead embossed along its center line and 10 blister projections for fastening to the mating angle stampings. All eight parts are set in the fixture and locked in correct relative position by moving a toggle lever.

This fixture is mounted on a central pivot carried on a slide so that the fixture with the slide can be moved toward and away from the operator by a cylinder controlled by a pedal operated valve. After loading the fixture in the out position, the operator moves the fixture inward, where it is locked with each of two gusset plates between flat dies of each of two 200-kva standard Federal welders. When so located, the operator used both hands in pressing two overhead buttons, as in Fig. 5, causing each of the two welders to close and make 10 projection welds on each gusset plate.

After these welds are made and dies open, the fixture is pulled back, turned 180° and moved inward again to repeat the welds on the second pair of gusset plates. Then the fixture is moved out, unloaded and reloaded for the next cycle. With this arrangement, 50 bases an hour are assembled by one operator.

Cabinets that fit on the base just described are made from wide sheets that are blanked, pierced and flanged in presses and then are converted into wraparounds in a tangent bender, leaving a vertical overlap near one corner. This overlap is roll-spot welded in the Federal welder. Fig. 6.

Structurals for 3000°F service—

Jet engines push WELDED MOLYBDENUM STUDY

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Wright Aeronautical Div.,
Curtiss-Wrght Corp.
Wood-Ridge, N. J.

Molybdenum's high melting temperature, 4750°F, and thermal conductivity seven times austenitic stainless steel, make it a prime target for study by metallurgists. Aircraft engine designers want to use molybdenum and its alloys as structurals in gas turbine and ramjet engines. Molybdenum alloys can be fabricated by welding. Helium shielded tungsten electrodes were used in tests. If stresses are not excessive, these alloys can be used in the 3000°F range. Poor oxidation resistance at high temperature is a headache. For sound welds, air and other sources of oxygen must be excluded. Weld reinforcement is needed on parts which are stretched or formed after welding. Welds with good room temperature ductility have not been made.

Interest in molybdenum and its alloys as a structural material for high temperature use has increased rapidly since the development of gas turbine and ramjet engines which operate at temperatures beyond the capacity of present heat resistant alloys. Stainless steels melt in the range of 2500° to 2600°F. Molybdenum has a melting point of 4750°F. anc about seven times the thermal conductivity of austenitic stainless steel. Because of these unique properties molybdenum has a wide potential use in this field.

Lack of oxidation resistance at high temper atures is the most serious shortcoming of molybdenum and work to develop suitable coatings is progressing rapidly. Fabrication will depend largely on development of welding techniques which can be applied to complicated sheetmetal structures. Although mechanical assembly of sheetmetal details is successful, excessive weight and certain design restrictions usually result.

The most useful atmosphere and elevated temperature properties of unalloyed and alloyed molybdenum now available are obtained in the as-rolled condition. Even stress relieving just below the recrystallization temperature will reduce the ultimate tensile and yield strength about 10 pct.

Recrystallization results in relatively low tensile properties and imparts a brittleness apparent when the material is subjected to shock loading a atmospheric temperature. However, if the load is applied slowly, recrystallized molybdenum will display greater ductility than the as-rolled material. Recent alloy developments have resulted in higher recrystallization temperatures and increased the useful

"A weld with appreciable room temperature ductility has never been obtained . . ."

temperature range for material which may be highly stressed above about 2000°F.

If stresses are not excessive, molybednum and its alloys may be used successfully in the 3000°F. range. Service in this range would in itself cause recrystallization regardless of the composition or original condition of the material.

In welding molybdenum all air and other source of oxygen be excluded from the weld. The metal's high melting point and thermal conductivity must also be considered. The latter property introduces problems somewhat similar to those encountered when welding copper and aluminum. The weld bead and adjacent heat affected parent metal will have properties typical of recrystallized metal regardless of the original condition of the material and may be unsuitable for some application.

Weldability of available Mo-W, Mo-V, Mo-Ti and Mo-Cb alloys were studied. These alloys have generally superior high temperature properties, higher recrystallization temperatures and may be more suited than pure molybdenum for most applications. The material used for all welding tests was in the form of 1/16-in. thick sheet rolled from arc cast ingots produced by Climax Molybdenum Co.

Machine butt welds using an inert gas shielded tungsten electrode were made. Helium was used as the shielding gas in preference to argon because of the greater heat produced at the arc and the resulting narrow weld bead.

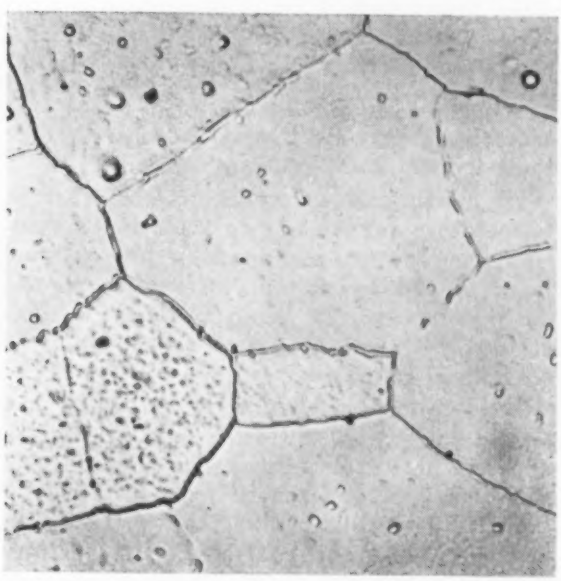


FIG. 1—Weld microstructure of a 1.0 V-Mo alloy. Etchant: 10g $K_3Fe(CN)_6$ + 10g KOH + 100cc H_2O. 1000X.

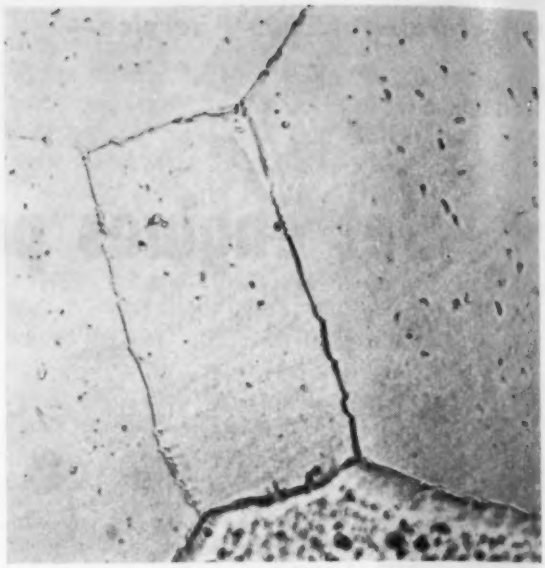


FIG. 2—Weld microstructure of commercially pure molybdenum. Etchant: 10g $K_3Fe(CN)_6$ + 10g KOH + 100cc H_2O. 1000X. Oxygen must be excluded for good welds.

Welding current and machine travel speed required to give satisfactory penetration depend largely on the fixtures and chills used and, to a lesser degree, on the mass of the material being welded. Amperage and travel speed settings for a particular setup can be readily established by trial.

Butt welds have been made successfully both with and without filler wire additions. Use of filler wire lessens the need of highly accurate fit-up of details and reinforces the weld. Weld reinforcement is needed on parts which are stretched or formed after welding. Welds made without filler wire additions, although generally sound and showing no greater tendency toward weld cracking, were inadequate for several parts which required severe sizing after welding.

A molybdenum weld with appreciable room temperature ductility has never been obtained and remains the most difficult problem for the welding engineer.

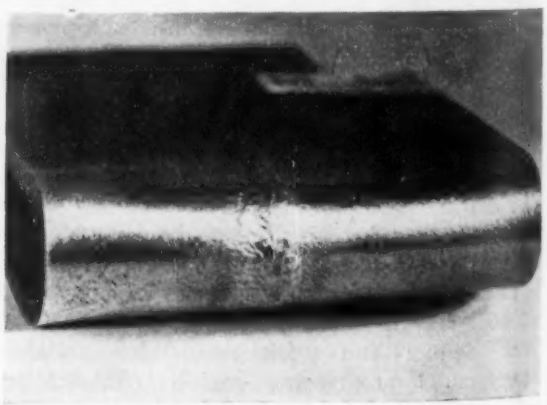


FIG. 3—Bends of 180° are made satisfactorily at 400° F with sound welds in all base metals tested.

Exact cause of the brittleness is not known, although it appears the lack of ductility in the weld and heat affected zone may be caused by oxides and/or carbides in the grain boundaries. Which of these causes exerts the greatest influence on weld ductility is not known.

Complete exclusion of air from the molten weld puddle is a must for high quality welds. Shielding characteristics of many commercial tungsten arc torches are not entirely adequate for welding molybdenum and to assure complete shielding of the weld special nozzles had to be designed. Not all torches are unsatisfactory but shielding characteristics of the torch should be evaluated before attempting to weld molybdenum.

Incomplete shielding resulting from poor torch design, too rapid welding speed and improper cleaning of material is indicated by gross weld porosity, readily detectable by x-ray examination. Since oxygen pick-up and resultant porosity are believed to be contributing causes of weld brittleness, these must be closely controlled.

Oxygen analysis of welds made under optimum welding conditions have indicated no pick-up of this gas occurred during welding. The occasional presence of porosity in spite of controlled welding conditions indicates some residual oxygen in the base metal may be a source of difficulty. Freedom from porosity is desired where the weld is to be subjected to a forming operation. Results from protective coating evaluation tests have indicated porosity in the weld near the surface may be detrimental to effectiveness of the coating.

FIG. 4—Tube made from 1/16-in. sheet, rolled to size and welded along the longitudinal joint.

All materials investigated were deoxidized by carbon and consequently were susceptible to carbide precipitation in the weld and heat affected zone. The continuous network of carbides shown in Figs. 1 and 2 is not unusual and may be generally expected to be present in the weld area. The detrimental effect of this condition is well known and methods of altering the mode of carbide precipitation should be extensively investigated. Addition of certain elements to the weld could possibly influence the precipitation of carbides. Boron, for example, has been found to be instrumental in preventing formation of a continuous carbide network in cast molybdenum, and may have a similar effect if added to the weld.

Epidemics of cracking

Use of carbon as the deoxidizer in car cast molybdenum, from the standpoint of weldability, is open to question. Other elements may deoxidize satisfactorily without undesirable formation of carbides. Climax Molybdenum has been investigating deoxidization of molybdenum with aluminum and further welding investigations on this material are in progress.

Although the welding procedures employed generally produce satisfactory results, occasional epidemics of weld cracking are encountered. In some instances it is possible to trace the history of the heat and correlate welding difficulties with poor yield in forging and rolling. The yield of sheet material from one Ti-Mo ingot, for example, was extremely small and as might be expected the welding difficulties were great.

Welds ductile at 400°F

The sheet was severely laminated and resulted in numerous weld cracks which propagated into the base metal. Variations in carbon content and residual oxygen, although within limits for successful forging and rolling are also believed to have a marked effect on the welding characteristics. Residual oxygen, in particular should exert a more detrimental influence on the ductility of a weld with its relatively large, as-cast grains than on fine grained, wrought material.

None of the welds, regardless of base metal composition, shows any appreciable ductility at room temperature. However, at 400°F welds of the materials tested become ductile. Fig. 3, for instance, indicates the extent to which a welded piece may be bent at this temperature. It should be noted that 400°F does not represent the minimum temperature at which ductility may be restored, since there is evidence of a substantial reduction in brittleness at temperatures as low as 300°F. Determination of minimum temperature required to obtain some set bend angle may be a suitable method

"Work on welded structural parts has been confined to . . . tubes, burner nozzles, gutters . . ."

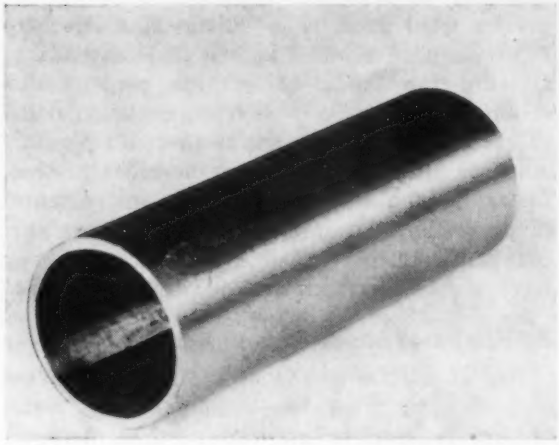


FIG. 5—Tubes 1 in. in diam and 3 in. long were made from each material. Parts were rolled to size, welded.

for evaluating relative alloy ductility. In light of this favorable response to temperature all assemblies subjected to forming after welding are maintained at a minimum temperature of 400°F during the operation.

The effect of welding upon room temperature physical properties of the base material is substantial. Molybdenum in the as-rolled condition will have an ultimate tensile strength of about 96,000 psi at room temperature. Recrystallization will lower the tensile strength to approximately 68,000 psi. A welded specimen with a good quality weld will have a tensile strength of about 53,000 psi. Failure generally occurs in the recrystallized parent metal of the heat affected zone. At temperatures above the recrystallization range the strength differential between a welded and unwelded component will probably be negligible.

FIG. 6—A 6-in. diam nozzle welded from sheetmetal has two conical sections and a flange. Critical dimensions were held by sizing operation after welding.

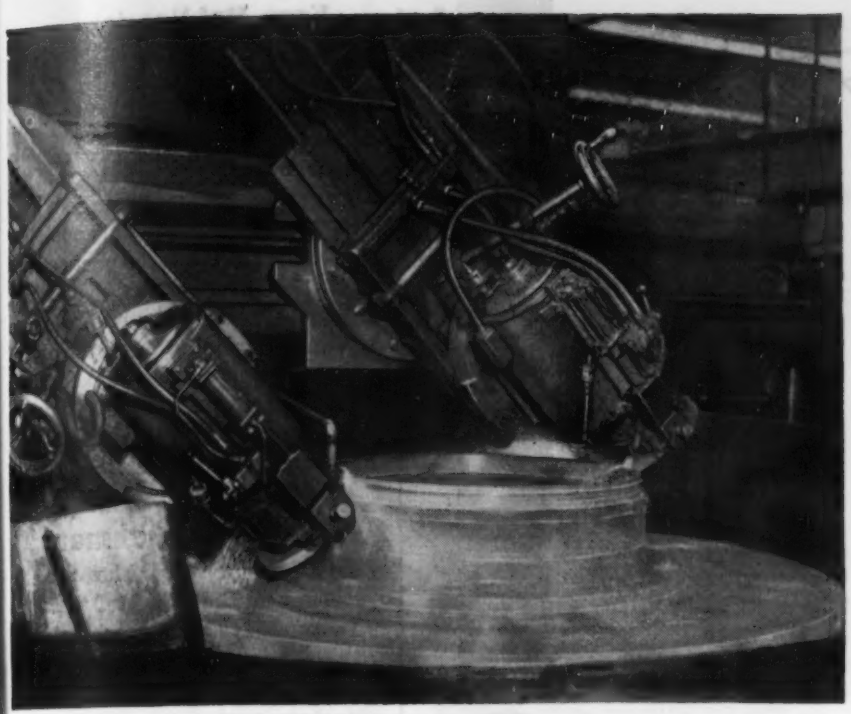
Attainment of ductile welds consistently appears to be controlled as much by techniques employed for producing molybdenum as by welding procedure. Development of a melting technique capable of producing molybdenum with an absolute minimum of residual oxygen and eliminating carbon as the deoxidizer would undoubtedly simplify the welding problem.

Preliminary work on welded structural parts has been confined to fabrication of tubes of various sizes, burner nozzles, flame gutters and similar components. One of the larger tubes, Fig. 4, was made from 1/16-in. sheet, rolled to size and welded along the longitudinal joint. Tubes 1 in. in diam and 3 in. long, Fig. 5, were made in like manner from each of the materials investigated. A 6 in. diam nozzle welded from sheetmetal is shown in Fig. 6. This part consists of two conical sections and a flange. Critical dimensions are maintained by a sizing operation after welding.

NEW BOOKS

"The Story of The Mushets," by Fred M. Osborn. This story of men, of David Mushet and his son Robert Forester Mushet, describes the trials and tribulations of two of England's pioneer steelmakers. David Mushet, at the turn of the 19th century, helped usher in a new era in steel. In 1863 his "Papers on Iron and Steel" were judged among the most valuable original contributions to iron manufacture presented to that time. Thomas Nelson & Sons, Ltd., Parkside Works, Edinburgh. $2.94. 195 p.

"Design Manual for the Repair of Aluminum Alloy Structures." This handy 6 x 9 manual shows with picture and text the right way to make repairs on aluminum structures, especially as applied to aircraft. Each of the more than 70 repair items, skin, extrusion, rolled section, tubings, etc., has been accurately designed and stress analyzed. Pertinent data on materials of construction, heat treats, finishes and shop processes and engineering tables are included. Johnson Research Corp., Bethpage. $3.50. 208 p.



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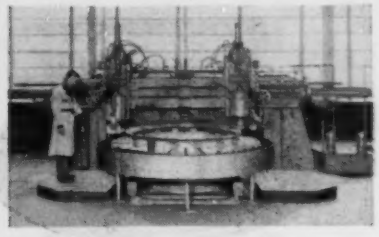
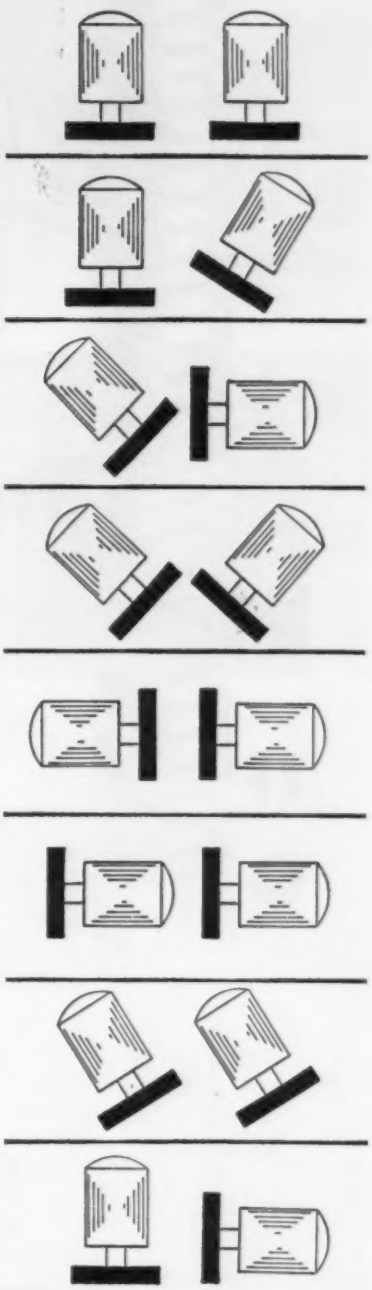


The diagrams below show a few of the many combination settings of Grinding-Spindle positions, suggesting the great versatility of these unique grinders:



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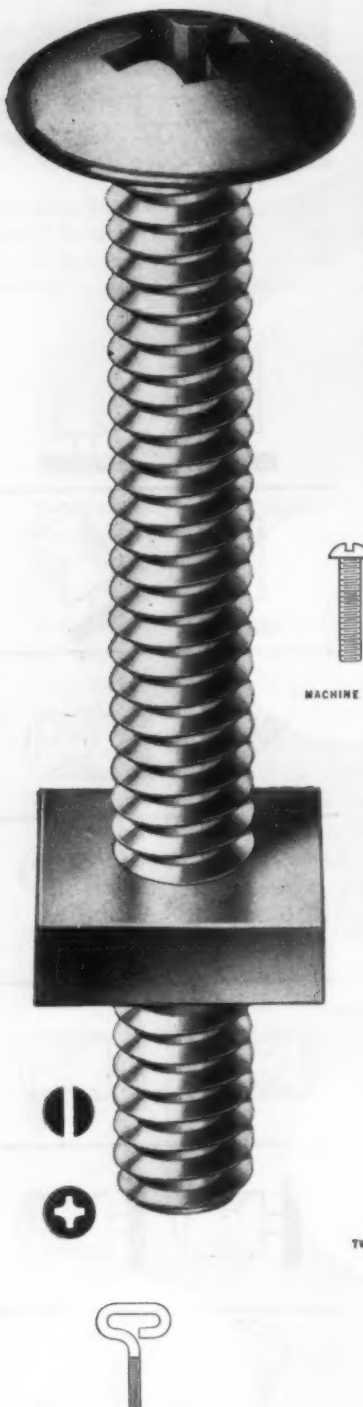

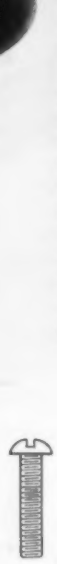

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Contour forming

The advantages of the Bath Universal Contour Former and Radial Draw Former are described in a new 32-p. booklet. The new publication shows how flanged parts can be formed without wrinkles and how extrusions are contoured to shape without sacrificing any part of the cross section. It also explains how parts are formed tangentially by stretch or compression forming on only one die. *Cyril Bath Co.*

For free copy circle No. 14 on postcard, p. 153.

Grinding attachment

Maneuverability of the portable grinder and the utility of the abrasive belt have been combined in a new belt grinding attachment outlined in a recent 4-p. folder. The attachment, available in two sizes, consists of a contact wheel, a supporting arm mechanism and an idler pulley which supports and aligns the abrasive belt. Designed specifically for use on Buckeye horizontal grinders, the attachment may be used with other makes of grinders of the proper type and speed. *Buckeye Tools Corp.*

For free copy circle No. 15 on postcard, p. 153.

Corrosion resistance

Anyone concerned with the problem of preventing corrosion will be interested in a new 44-p catalog on the Insul-Matic Corp. of America's Gilsonite base protective coatings. The coatings are used mainly to prevent corrosion of industrial equipment, especially in chemically contaminated atmosphere, to waterproof buildings and to act as a weather or vapor barrier over thermal insulation. Also treated in the booklet is a special cork-filled coating which performs the double function of insulation and corrosion prevention. *Insulmatic Corp. of America.*

For free copy circle No. 16 on postcard, p. 153.

Handling attachments

Special-purpose additions for basic materials handling machines are described in a new catalog. The attachments, tools and accessories covered in the booklet are reported to lower the cost and increase the ease of handling. *Hyster Co.*

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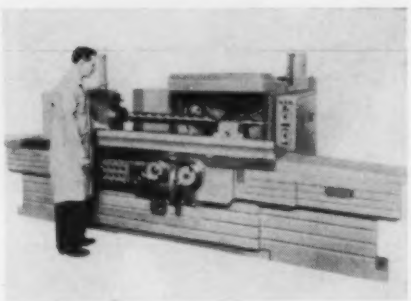
NEW equipment

New and improved production ideas, equipment, services and methods described here offer production economies . . . fill in and mail postcard on page 153 or 154.

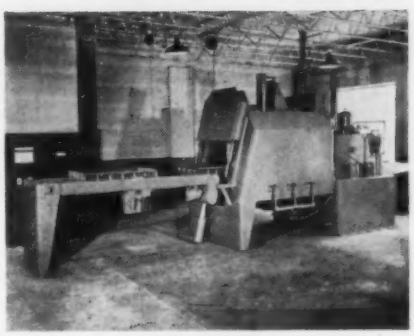
Large-capacity machine grinds threads, worms



New style 36 precision thread grinder has flexibility, accuracy, and automatic cycles that speed production work. It grinds single or multiple threads, left or right hand, in any pitch from 1 to 128 threads per in. It can be used with single or multiple-rib grinding wheels. Relation of work spindle speed to table feed can be changed by means of change gears to produce various leads. Right or left hand threads may be ground simply by positioning a lever. Several types of diamond dressers may be used on the grinder. *Ex-Cell-O Corp.*

For more data circle No. 18 on postcard, p. 153.

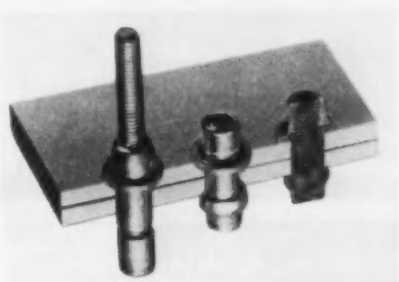
New 500 lb per hr production heat-treating unit



Automatic sealed atmosphere and temperature control from heat through quench are features of a new medium sized heat-treating unit. Model T-500 is available for electric or gas-fired operation. Automatic transfer of work from heat through the quenching, or cooling cycle, is another feature. Quench tank is direct-connected to the heating chamber, separated by an automatic airdraulic-operated intermediate door. Cooling or quenching is handled in controlled atmosphere. Work is transferred from heat to quenching chamber without breaking the atmosphere seal. *Ipsen Industries, Inc.*

For more data circle No. 19 on postcard, p. 153.

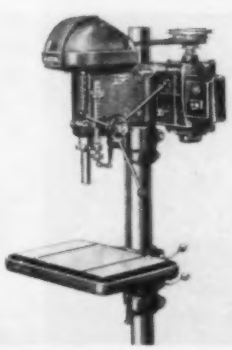
One-person installation from one side of work



Savings in time can be realized on both maintenance and manufacturing assembly jobs through use of Blind Lockbolts. These blind fasteners are installed by one person from one side of the work. They are heat treated alloy steel fasteners having a positive swaged lock and exceptional strength and pull-together. They are approved by the Armed Forces; and can be used where aluminum rivets do not possess sufficient strength. Blind Lockbolts are available in ¼ and 5/16-in. diameter. *Huck Mfg. Co.*

For more data circle No. 20 on postcard, p. 153.

Drill press offers greater accuracy, capacity



Outstanding features of a new 18-in. heavy-duty general purpose drill press include: massive construction to take full advantage of Clausing's greater tool and job capacity; drive spindle supported by two sealed-for-life ball bearings; tough, precision ground spindle floated free from quill by a sealed-for-life ball bearing at top and a double row bearing at bottom; Vernier depth stop with control accurate to 0.001 in.; 6½ in. spindle travel for bigger work capacity. The machine tool drills to 18¼-in. circle; drills ¾ in. in steel, 1 in. in cast iron. *Clausing Div. Atlas Press Co.*

For more data circle No. 21 on postcard, p. 153.

Turn Page

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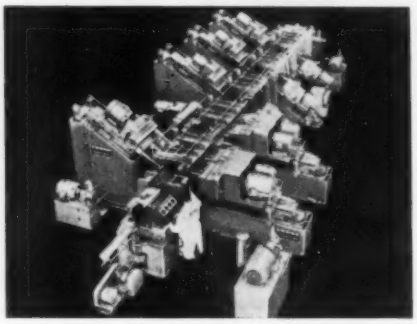
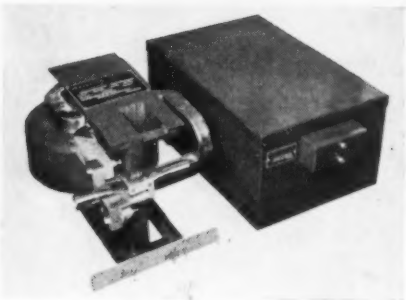


Special machine tool produces V8 cylinder blocks

One hundred twenty cylinder blocks per hr at 100 pct efficiency can be produced on a new 19-station machine tool. One station is for loading; ten are for drilling, boring, reaming, countersinking and spotfacing; two are for gaging; one is for cleaning; four are idle and one is for unloading. Hydraulic and electrical construction is to JIC standards. Locating, clamping, positioning and transferring are accomplished hydraulically. A Cross machine tool control unit automatically stops the machine when any tools need changing. Preset tools are on the job for use when needed. *Cross Co.*

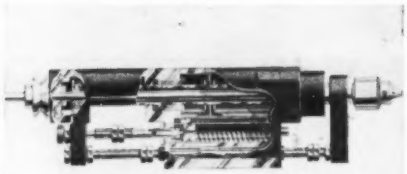
For more data circle No. 22 on postcard, p. 153.



Electromagnetic pump for moving molten metals

An ac electromagnetic pump with no moving parts pumps liquid metals and other low resistance conducting fluids at temperatures to 1000°F. Pump can be used to move any conducting fluid that has a specific resistance equal to or less than stainless steel (approximately 90 microhm-cm). It operates on the principle that a current-carrying conductor in a magnetic field is acted on by a force. In this case the fluid serves as the conductor, so that when current and flux are properly applied, pumping occurs. *General Electric Co.*

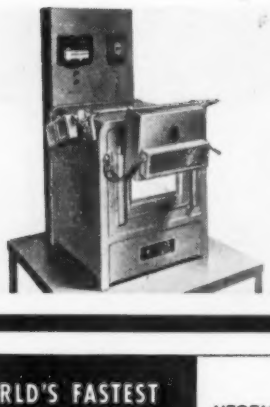
For more data circle No. 23 on postcard, p. 153.



Air drill unit has universal application in setup

The Gurmendi air powered drill unit features full control of stroke and speed of feed; positive adjustment for forward and return strokes to and from work; simplicity of operation and maintenance. Stroke is a full 2 in. with controlled feed of 1¼ in. effected by unique hydraulic monitor which takes the "sponginess" out of air. *Alkon Products Corp.*

For more data circle No. 24 on postcard, p. 153.



Larger bench furnace heat treats to 2000°F

A larger companion furnace offers the same quality features as the standard VK-6 model. Chamber dimensions are 10x6x18 in. The VK-7 has heating elements of 6.5 kw capacity, at 220 v single phase, on all four sides of the chamber and in the door. This provides even heat distribution and close temperature uniformity. Embedded design protects element wire against atmospheric attacks and mechanical breakage. A complete package includes furnace, wired and mounted control panel. *Cooley Electric Mfg. Corp.*

For more data circle No. 25 on postcard, p. 153.

WORLD'S FASTEST FLAW LOCATION
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HERE'S TURCO'S NEW PRODUCTION-LINE METHOD OF FLAW LOCATION...SIMPLE, SAFE & ACCURATE. SAVES YOU MONEY & TIME!
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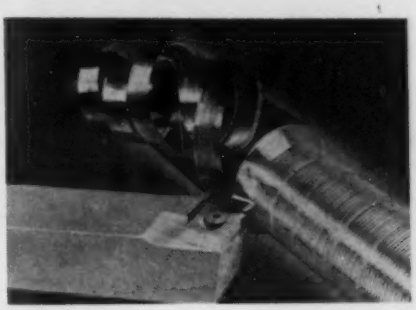
LASTING VISIBILITY OF FLAW INDICATIONS PERMITS ECONOMICAL RE-WORKING AT YOUR CONVENIENCE.
RE-WORK WELDERS SAY
MAKES EACH JOB EASIER BECAUSE WE CAN SEE WHERE THE DEFECTS ARE!

Turning tool takes extra large cuts



Outstanding performance in turning, facing and shaping, as well as boring of large diameters is claimed for a new clamp-on turning tool known as Hefti-Cut. The tool consists of a rugged alloy steel shank which holds carbide blanks. Method employed for holding the blanks achieves maximum rigidity while providing for maximum carbide tip usage. A two-way blank-positioning adjustment allows a greater portion of the blank to be used before it must be discarded. *DoAll Co.*

For more data circle No. 26 on postcard, p. 153.

Air movers remove welding fumes and sparks

Air movers can be put close enough to welding operations to remove practically all fumes and sparks, discharging them into the upper atmosphere of the building. They are 3 ft long, with total weight of 5 lb largely in the base so that they stand readily in almost any position. Flexibility in handling the device on the job makes it easy to use outside or inside large weldments. The self-contained devices remove 4 to 6 cu ft of air per sec when operating on 20 to 30 lb air pressure. *Mine Safety Appliance Co.*

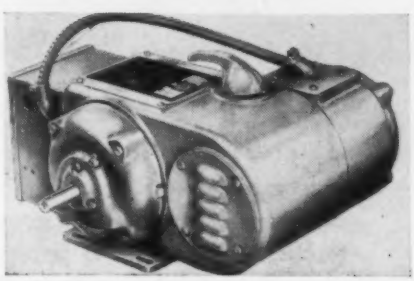
For more data circle No. 27 on postcard, p. 153.

Electrolytic process cleans welded seams

Removing heat discoloration from welded seams is possible with a new electrolytic process, that is simple and inexpensive to set up and operate. An alternating current power source is used. Equipment consists of a short length of copper rod, some rubber tubing, electrical wiring clamps, a small stepdown transformer, and a solution of 50 pct phosphoric acid. Discolored weld seams can be treated at rates of 2 to 4 fpm. The process leaves the weld area clean and bright, free of discoloration and light scale. *Armco Steel Corp.*

For more data circle No. 28 on postcard, p. 153.

Control dial changes motor speed



Single phase **variable speed** motor provides speeds in a 10:1 ratio with the range from 4 to 10,000 rpm. **Speeds are changed** without stopping by turning a control dial. These compact lightweight motors permit use of 110 or 220 v. They occupy little more room than a standard fixed speed motor. Type VA-C Varidrive is made in ¼, ⅓, ½ and ¾ hp. *U. S. Electrical Motors, Inc.*

For more data circle No. 29 on postcard, p. 153.

Turn Page

CHIEF INSPECTORS REPORT

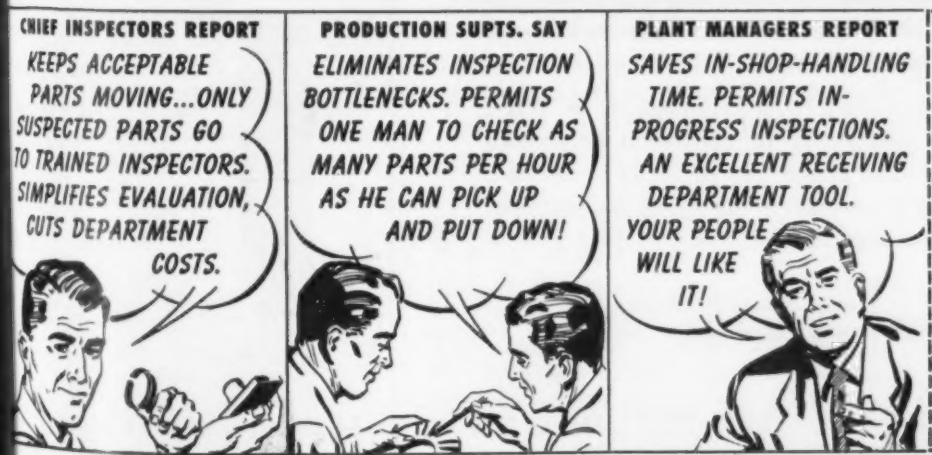
KEEPS ACCEPTABLE PARTS MOVING...ONLY SUSPECTED PARTS GO TO TRAINED INSPECTORS. SIMPLIFIES EVALUATION, CUTS DEPARTMENT COSTS.

PRODUCTION SUPTS. SAY

ELIMINATES INSPECTION BOTTLENECKS. PERMITS ONE MAN TO CHECK AS MANY PARTS PER HOUR AS HE CAN PICK UP AND PUT DOWN!

PLANT MANAGERS REPORT

SAVES IN-SHOP-HANDLING TIME. PERMITS IN-PROGRESS INSPECTIONS. AN EXCELLENT RECEIVING DEPARTMENT TOOL. YOUR PEOPLE WILL LIKE IT!



Turco Products, Inc., Dept. 103
832 East 62nd St.,
Los Angeles 1, Calif.

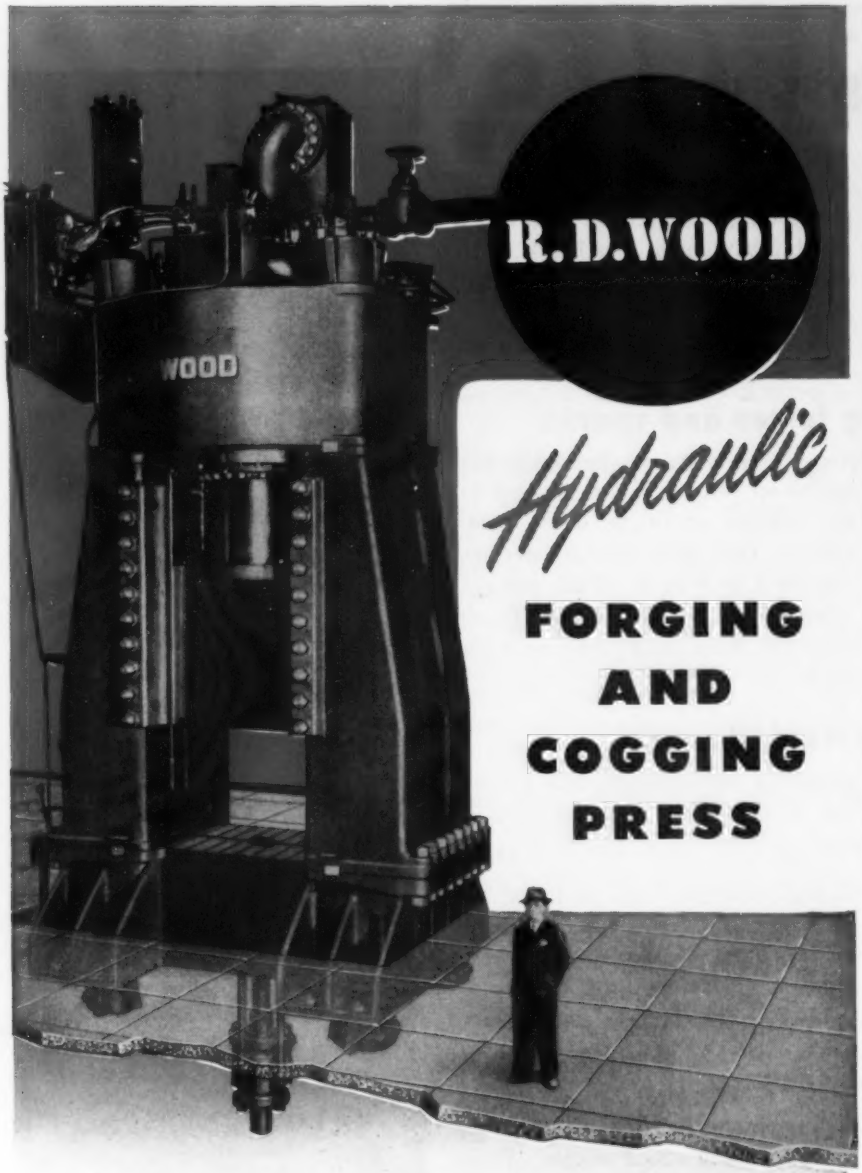
Gentlemen:

Please send me your latest information on the world's fastest flaw location methods—flexible ☐ Dy-Chek, or the production-line tool ☐ Chek-Spek, (check one or both). No obligation, of course.

NAME _____

TITLE _____

Simply staple coupon to company letterhead



This big hydraulic press is designed and built for continuous heavy duty operation at high speeds. In die forging and ingot cogging, in addition to general press service of forming, forcing, upsetting and impact extrusion of all metals, this press is virtually unaffected by fatigue of impact shock, hydraulic surges, rapid stress reversals and similar factors. Supplied in 1500 and 3000 ton capacities, the press is down-working, and accumulator operated.

Press control is accomplished by a patented R. D. Wood system, permitting a sensitivity of operation heretofore unattainable. Pressure and speed are perfectly controlled; instantaneous stopping or reversal of the stroke is possible at any point. Write for complete information.

HYDRAULIC PRESSES AND VALVES FOR EVERY PURPOSE • ACCUMULATORS • ALLEVIATORS & INTENSIFIERS

EST. 1803

R.D. Wood Company

PUBLIC LEDGER BUILDING, PHILA. 5, PA.

Diamond wheel lap

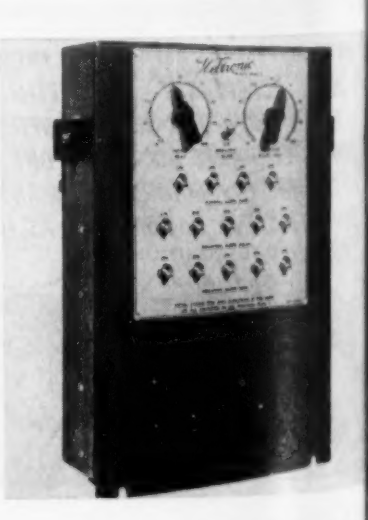
Life of cutting tools are claimed to be increased from 3 to 6 times and sharp, finish-lapping cutting edges obtained through use of a new method of wheel lapping. Spectrum diamond lapping compound in any desired grit size, produced from pure virgin diamonds, is applied to special Spectrum lapping wheel. The wheels are made from materials that retain their shape and wear indefinitely. They are interchangeable on all tool grinders. Kits contain diamond compound, lapping wheel, lapping oil, applicator and wheel charging roller. *Penn Scientific Products Co.*

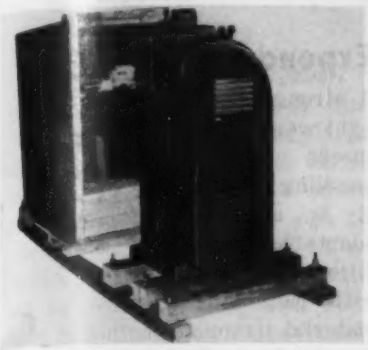
For more data circle No. 30 on postcard, p. 153.

Welding slope control

For exacting critical welding applications involving aluminum, magnesium, and dissimilar metals, use of a new control accessory is recommended whenever MIL-W-6860 specifications must be met. Synchronous precision control with positive and negative slope control has been certified and is capable of qualifying a machine on single phase. This control provides 7B and 9B sequence timer, phase shift heat control and slope control designed to give a slope of the current at the beginning of weld time, a fixed level heat current value during a portion of the weld, and decays the current at the end of the weld. *Weltronic Co.*

For more data circle No. 31 on postcard, p. 153.





Packaging a lathe

A new packaging technique for the protection and shipment of a 3600-lb engine lathe is said to save 50 to 75 pct in costs and 55 pct in weight of the package. Sheets of heavy solid fiber are stapled to a simple wooden frame bridging the center of the lathe and attached to the wood skid on which the lathe rests. A lid is stapled and tacked to the top portion of the fiber and wood frame. Result is a streamlined, dust resisting package peaked in the center to shed showers that might fall during transportation. Container can be assembled by two men in 30 min. Principle is adaptable to machine tools of varying sizes. *Gaylord Container Corp.*

For more data circle No. 32 on postcard, p. 153.

Deep hole drilling

An automatic deep hole drilling unit using the step-by-step feeding principle can be installed on most drill presses. It is mounted abov the spindle so that it does not crowd aisles. Its cycle begins by rapid approach to the work, stopping 1/32 in. above it. Second cycle feeds the drill into the work at an infinitely variable drill feed speed and to a depth of step varying from 1/32 to 5/8 in. Next cycle is an automatic rapid retraction from the work to prevent chips dropping back into the hole. This allows coolant to enter partially drilled hole. Cycle of operations is repeated until pre-determined depth of hole has been reached, when the drill withdraws from hole and machine shuts itself off. *General Pacific Corp.*

For more data circle No. 33 on postcard, p. 153.

Turn Page

For safer assemblies use the dependable

extra strength

of Cleveland High Carbon Heat Treated Cap Screws

• For assembly jobs needing fasteners of high tensile strength, it pays you to use popular Cleveland High Carbon Heat Treated Cap Screws—those accurately formed, extra strong screws. They're toughened by heat treating—but that's not the whole story of their dependable holding quality. They're notably *stronger* because made of high carbon steel by the Cleveland-developed Kaufman *Double Extrusion* Process of cold forging—a method that assures you fasteners in which the steel's grain flow conforms to the contour of the screw. Controlled high temperature hardening and drawing give them the extra benefits you expect from heat treated parts. Be sure to specify and buy Cleveland High Carbon Heat Treated Cap Screws.

CLEVELAND *Top Quality* FASTENERS

THE CLEVELAND CAP SCREW COMPANY
2920 East 79th Street, Cleveland 4, Ohio
Warehouses: Chicago • Philadelphia • New York • Providence
originators of the Kaufman DOUBLE EXTRUSION Process
Ask your jobber for Cleveland Fasteners

CLEVELAND tapping machines lead screw

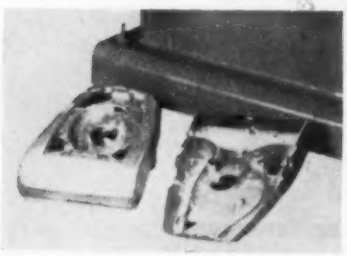
What's Your Tapping Problem?

Check with Cleveland first if you have a tapping problem. Cleveland engineers have solved hundreds of problems like these.

20 MM SHELLS

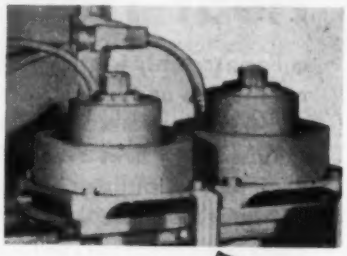
For a munitions maker we designed a Cleveland Tapper which taps two 20MM shells per machine stroke at the rate of 1180 pieces per hour. It uses a stroke of ½" cutting at a spindle speed of 420 RPM at 68 SFM with a tapping cycle of 36 turns or 5.1 seconds plus 1.0 second for the table index.

SWEEPER BODIES



For a leading appliance manufacturer Cleveland engineers designed a Cleveland Tapper to tap four 10-24 and one 6-32 holes in the top face of the main casting and five 10-24 and two 8-32 holes in the bottom face... both sides simultaneously all with lead screw controlled spindles for complete accuracy.

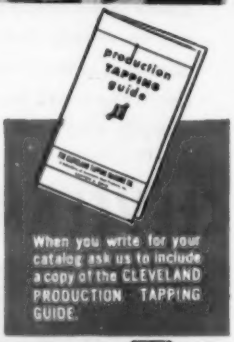
ROCKET PARTS



Cleveland engineers designed and built a Cleveland Tapper which turns out 3.5 rocket bodies at the rate of 100 pieces per hour. Cleveland Tappers are saving priceless man hours on defense and civilian production jobs.

Mr. Lead Screw says:

Only a Cleveland Tapper offers you ALL the features you want... Quickly changed spindle speeds... Heat treated alloy spindles... Precision depth control... Super sensitive clutch... Positive coolant and lubricant supply. *Check with Cleveland First* if you need to do Tapping, Threading, Chamfering, and Core Drilling. Write for Catalog *R-12*.



When you write for your catalog ask us to include a copy of the CLEVELAND PRODUCTION TAPPING GUIDE.

THE CLEVELAND TAPPING MACHINE CO.
A Subsidiary of AUTOMATIC STEEL PRODUCTS, INC.
CANTON 6, OHIO

—New Equipment—

Continued

Expendable pallets

A strong fiber pallet of unusually light weight reduces physical labor, speeds packaging and expedites handling and storage of material. It is economically priced and adaptable to various loading conditions. Units may be utilized with palletizing adhesive or the material strapping method of binding the load. Pallets are made of honeycomb material, faced on either side with heavy kraft. Legs, nine per pallet, are 8x8 in. square, with crushing strength of 60 psi. Intended to be expendable, tests have proven that additional trips have been made with this pallet. *Fiber-Weld Corp.*

For more data circle No. 34 on postcard, p. 153.

Anode basket

Use of scarce, costly anode metals is made possible by the new Forcite anode basket. It is designed for efficient, complete solution of scrap or ball anode material and may be used in nickel, and copper, lead, and all cyanide baths. Fabricated from reinforced steel, the basket is coated with an inert, insulating material. Contact is made by perfectly shielded, inert graphite blades the entire depth of the basket and coupled to the anode bars. Baskets are 24 or 30 in. long. *R. O. Hull & Co.*

For more data circle No. 35 on postcard, p. 153.

Car wheel boring tool

New three-in-one car wheel boring tool prevents bar deflection and machine damage when boring cored hub wheels. A set of extra cutters located between the first roughing cutters and the final finishing cutters provides for continuous cutter contact in the bore during the boring cycle regardless of the cored openings in the wheel hub. Cutters actually support the boring tool in the bore, lending rigidity to both bar and machine ram. This in turn prevents deflection which might cause serious ram distortion and needless breakage of cutters. *Davis Boring Tool Div., Giddings & Lewis Machine Tool Co.*

For more data circle No. 36 on postcard, p. 153.

Vacuum coating

Vacuum metallizing equipment is now offered with a 5½-ft diam tank coater for handling larger loads and larger pieces. A variety of pumping systems are offered which can be tailored to suit the customer's requirements. The system currently offered for maximum production consists of two 16-in. diffusion pumps, two 16-in. booster pumps, and a 200 cfm mechanical roughing pump. Reportedly the 5½-ft tank can be pumped to coating pressures in less than 5 min with this pumping system under ideal conditions. *National Research Corp.*

For more data circle No. 37 on postcard, p. 153.

Sine plates

For close tolerance layout and inspection work on large pieces two new sine plates are available in 5 and 10-in. sizes. Broad working surfaces permit difficult checking jobs to be handled with ease and compound angles can be checked on large pieces in conjunction with another sine plate or sine bar. A three-point base arrangement uses two short cylinders, in place of the single piece base cylinder commonly employed. Lapped and serrated working surfaces are held flat and square within extremely close tolerances. *DoAll Co.*

For more data circle No. 38 on postcard, p. 153.

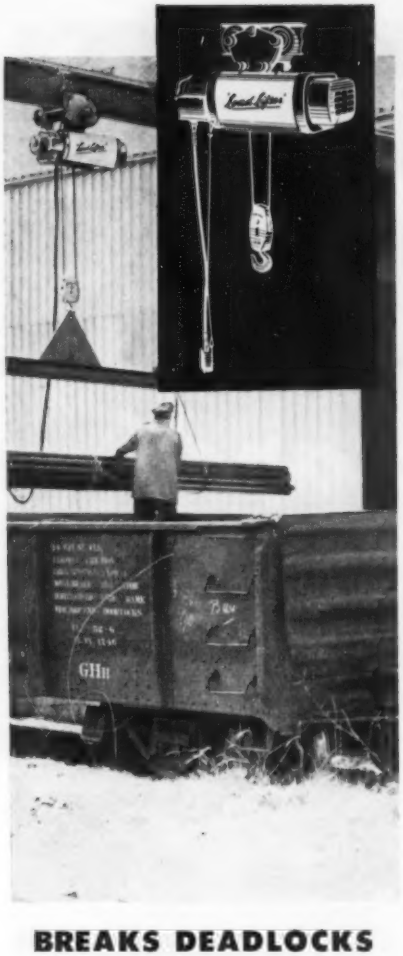
Welder-auxiliary power

Equipped with complete engine accessories and auxiliary apparatus, a new lightweight compact engine-driven welder can supply 110 v, 60 cycle, single-phase power from a conventional plug-in outlet. Nominal rating of the welder is 200 amp, 40 v, 60 pct duty cycle with current range from 40 to 250 amp in accordance with NEMA standards. During off-welding periods, auxiliary power of 3 kw at 100 pct power factor or 2 kva at 80 pct power factor are available for lights and power tools. During welding periods about 300 watts auxiliary power is available for lights. *Westinghouse Electric Co.*

For more data circle No. 39 on postcard, p. 153.

Turn Page

PEACE TIME
DEFENSE TIME
EVERY TIME
"Standard's"
Welded Mechanical Steel Tubing
MAKES THE TOUGHEST TUBING FABRICATION POSSIBLE
automobile propeller
automobile (banjo) axle housing
spun tubular coupling
If you need the best tubing for civilian or defense purposes, "Standard's" Mechanical Steel Tubing can really "take it".
Automobile manufacturers too, know "Standard" welded tubing safely stands the severest tubular applications. This is proven in the automobile propeller shaft that operates safely and dependably at high R.P.M.'s day in and day out.
Peace time, defense time, every time—"Standard's" modern facilities, and 25 years of tubing know-how, assure you the highest quality tubing available.
Specify "Standard" —IT PAYS!
THE STANDARD TUBE CO.
Detroit 28, Michigan
Welded Tubing
Fabricated Parts
STANDARDIZE with STANDARD — It Pays
CARBON STEEL TUBING
½" O.D. to 5½" O.D.
.028 to .260 wall
STAINLESS STEEL TUBING
⅜" O.D. to 3" O.D.
.028 to .095 wall



BREAKS DEADLOCKS IN PRODUCTION - -

Efficient load handling is the key to smooth-flowing production. The "Series 700" 'Load Lifter' Electric Hoist lifts a ton 30 feet a minute — shortens the handling cycle — gives men time to produce more.

The 'Load Lifter' operates at the push of a button. Man, load, and hoist are safeguarded by steel suspension, strong, heat-treated helical gears, powerful load and motor brakes, and only 24 volts at the push button.

Let the dependable fast-acting 'Load Lifter' wipe out delays and reduce costs for you. Capacities: ½ ton and up; single and two-speed control. Write for Bulletin 399.

MAXWELL MANNING & MOORE

'Load Lifter'®

ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

MUSKEGON, MICHIGAN

Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

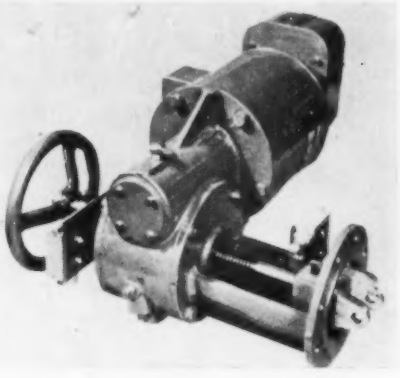
—New Equipment—

Continued

Valve drive

A new gear motor drive gives reciprocating linear movement of the drive shaft, for operating slidin cams, ventilating covers, hatches, large windows, floor lifts, doors, gates. It is available in ratings from ⅛ to 1 hp; can be operated either manually or by remote control. *Janette Electric Mfg.*

For more data circle No. 40 on postcard, p. 153.



Relining brakes

New replacement unit consists of a brake lining bonded at the factory to a metal backing plate. The bonded unit can be quickly and permanently attached to practically any automotive brake shoe. Installation is simple; can be done by anyone with ordinary hand tools. Mechanical simplicity, safety and positive braking action are claimed for the new unit. *Lock-On Brake Lining Corp.*

For more data circle No. 41 on postcard, p. 153.

Aluminum coating

An industrial aluminum coating can be sprayed without spattering objects or surfaces 4 ft or more in the background. It dries to a cottony, non-adhering powder 4 ft of travel from the spray gun nozzle. Roylac provides a tightly bonded corrosion-resistant film with a bright aluminum finish, particularly effective exposed to acid-type fumes and salt or moist air. The material is plasticized to provide a film of good flexibility and bonding tack. Dries in 12 min; can be applied by brush. *Royston Laboratories.*

For more data circle No. 42 on postcard, p. 153.

Threadless pipe joint

A factory assembled pipe coupling can be installed in any piping system in less than 60 sec, it is reported. No thread cutting is required. Pipes to be connected are simply inserted into the ends of Quik-Joint coupling body and the locknuts wrenched to desired tightness. The result is a tightly sealed but flexible joint capable of withstanding working pressures up to 2000 psi. *Quik-Joint Mfg. Co.*

For more data circle No. 43 on postcard, p. 153.

Flaring tools

Two new flaring tools make 37° flares on soft steel, copper, aluminum and fully annealed stainless steel tubing. Flares made by the tools conform to JIC specifications. A wide range of sizes of tubing can be flared with a single, compact, lightweight tool. One model embodies an automatic burnishing mechanism which provides a highly polished finish to the face of the flare after it is formed. *Imperial Brass Mfg. Co.*

For more data circle No. 44 on postcard, p. 153.

Dial test indicator

Surface flatness, alignment, out of roundness, relative heights and locations can be accurately determined with a new universal dial test indicator. Simplified mechanism excludes train of gears, resulting in smoother and more sensitive action. The instrument is lightweight but substantial. *Lufkin Rule Co.*

For more data circle No. 45 on postcard, p. 153.

Smoke Control:

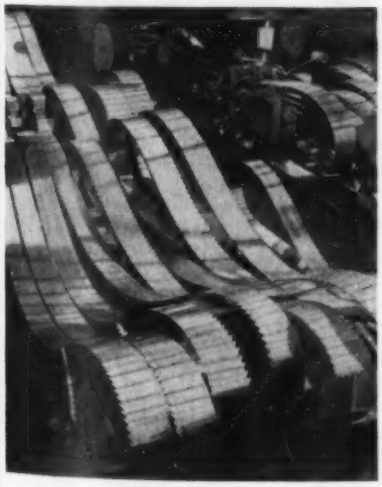
Instruments help operator keep stacks clear, pollution down.

Boiler instrumentation is an important factor in elimination of air pollution, Earle C. Miller, Riley Stoker Corp., Worcester, Mass., recently told members of the Air Pollution & Smoke Prevention Assn. meeting in Cleveland.

Most plants provide instrumentation for the operator to control air-fuel ratio. In many plants, however, the fireman has the job of maintaining a clear stack without being able to see the stack. Many plants are installing periscopes, mirrors and smoke recording instruments which give the operator a better view of the stack.

A simple periscope permits the operator to observe the density of the smoke in a mirror conveniently located at the operating floor. This simple instrument does much to make the operator smoke conscious and provides him with an easier means of checking his operation, Mr. Miller stated.

A Utiliscope installed experimentally on a Midwest spreader stoker furnace permitted the operator to observe distribution of coal on the grate. Development of smoke within the furnace could be observed well in advance of trouble in the stack.



BIG BAND SAW blades—endless 50 footers—pile up waiting shipment on floor of Simonds Steel & Saw Co., Fitchburg, Mass. Blades, joined with General Electric atomic-hydrogen welding equipment, operate at high speed and often flex 440 times a minute in service.

Turn to Page 166

Cuts 100 hour packaging job to 40 hours!

This 60% savings in packaging time is only part of the story. Now that Whitin Machine Works — big name in textile machinery — has adopted Angier's vapor method of rust prevention, parts are stored or shipped *clean* to *stay* clean . . . always ready for instant use. What a savings in "degreasing" time and equipment.

One box of the bottom rollers shown above required a full hour to "clean". With a monthly average of 400 boxes, customers have been spared 10 man-weeks in labor costs. Meanwhile, Whitin now packages these rollers in six minutes instead of fifteen — a monthly total of 40 hours instead of 100.

Used here as a box liner, Angier VPI* Wrap gives off a protective vapor that permeates the area around shiny parts . . . it robs moisture and air of all rust-making power. VPI is such a simple way to store or ship metal that you, too, will discover impressive savings. Send today for facts that apply to your industry.

Angier

The Most Experienced Name in Vapor Rust Preventives

*® *Vapor Rust Preventive*

Distributors in Principal Cities

Angier Corp., Framingham 10, Mass.

Name.....

Title.....

(Clip this to your letterhead)

Please send "VPI Facts" as applied to:

- ☐ Machinery-Industrial, Metal Working, Farm, Office, Construction.
- ☐ Electrical Machinery, Appliances, Products.
- ☐ Transportion Equipment — Auto, Aircraft, Naval, Railroad, etc.
- ☐ Fabricated Products — Cutlery, Hardware, etc.
- ☐ Steel in process of fabrication.
- ☐ Ordnance Equipment.
- ☐ Instruments and clocks.
- ☐ Other.

MILLIONS and MILLIONS OF DOLLARS
RUST DAMAGE
. . . CAUSED EVERY YEAR!

why Derusto?
because Derusto
PREVENTS RUST
STOPS
RUST

DERUSTO has successfully passed all tests given by the Pittsburgh Testing Laboratory.

DERUSTO comes in standard industrial colors . . . ready for spraying, brushing, or dipping.

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MASTER BRONZE POWDER COMPANY
5009 CALUMET AVE.
HAMMOND, INDIANA

—Technical Briefs—

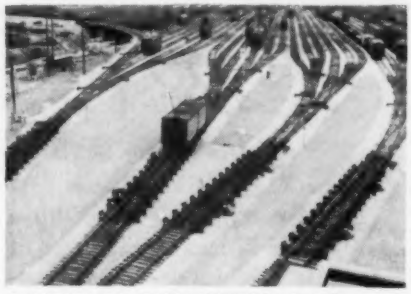
Faster Freight:

Automatic switching and retarder speed control used in yards.

Faster freight car handling will result from a new "first" in railroad history—a freight classification yard employing both automatic switching and retarder speed control. In use at Air Line Yard of the Chicago, Milwaukee, St. Paul & Pacific R.R. Co., in Milwaukee, upwards of 2000 cars per day can be classified via push button.

The operator, from a control tower which looks out on the entire yard, can route a freight car by gravity from the top of the grade where a switch engine has pushed it, to any one of 25 tracks. By pressing a button he can govern the car's speed.

Installation of the equipment cost approximately $3 million. De-



LAYOUT OF PUSH-BUTTON freight yard, first in history, seen from tower in Milwaukee's Air Line yard. Twenty-five classification tracks have capacity of 1095 cars.

vices used and the system are the product of Union Switch & Signal Div., Westinghouse Air Brake Co.

Control Panel — The control panel carries a full diagram of the 25-track yard layout, with a numbered button for each classification track, and buttons for each retarder.

Cars leave the master retarder at 5 to 15 mph and are controlled to leave the group retarder at speeds of 3 to 10 mph, depending on how heavily loaded they are and how easily they roll. The grade of the tracks after leaving the retarder is such that the cars gradually slow down to a stop.

Volume Greater—The switching system permits the Milwaukee

an ACCO product WIRE
ROUND
FLAT
OR
SHAPED
PAGE
makes them all...
LOW CARBON
HIGH CARBON
STAINLESS
SPECIAL ALLOY
ARMCO IRON
YOU draw the Shape
—Page can draw the Wire
Tell us the way *you* want it. We'll follow *your* specifications.
Cross-sectional areas up to .250" square; widths up to ½"; width-to-thickness ratio not to exceed 6 to 1.
Wire or Write Today
PAGE WIRE
ACCO
PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE
Monessen, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Portland, San Francisco, Bridgeport, Conn.

Road to keep abreast of a mounting volume of classification business, reduce per diem charges, and cut loss or damage in switching operation.

The Milwaukee Road handles 75 pct of all switching operations in the Milwaukee Terminal area where it has 45 miles of main track

RETARDERS SLOW speed of freight car loaded with automobile frames as it moves over top of gravity hill in Milwaukee Road's yard. Note retarders foreground.

and 285 miles of industrial and yard siding. Forty to 50 trains enter or leave the terminal daily. First objective of the new system is to speed service.

Improved handling methods were made necessary by the recent industrial growth of the Milwaukee area. The output of its food, machinery, beer, clothing and other plants is unique among American cities. In 1941 fewer than 25,000 cars of beer were loaded. In 1951, more than 50,000 cars of beer were loaded in the Milwaukee Terminal.

Navy Develops New Magnets

A new magnetic material developed by the Naval Ordnance Laboratory, White Oak, Md., exhibits a coercive force of 3000 oersteds, greater than any known permanent magnetic material. Composed of bismuth and manganese, the new material has a flux density exceeded only by platinum-cobalt alloy.

Magnets can be made by powder metallurgy technique, thus insuring close tolerance of complicated shapes without machining. Production involves heating powdered manganese and bismuth at 700°C, hot-pressing the bismuthide at 300°C in a magnetic field.

Turn to Page 168

ROLOCK
FABRICATED ALLOYS

AN ASSEMBLY THAT
"Gives a Lift"
TO AN IMPORTANT
HEAT TREATING JOB

Four sets of these Stacking Furnace Baskets were custom-fabricated by Rolock to fit pit-type furnaces built by Hevi Duty Electric Company. Photo at left shows bottom grid, mesh disc, lift straps and fastening keys. Photo at right shows complete assembly ready for furnace.

They are used by a nationally known manufacturer for hardening at 1850° F. Material of basket is type 330 stainless steel. Size, each basket, 28″ I.D. x 12¾″ high. To facilitate handling in and out of the furnace the baskets are securely fastened together with alloy lift straps and keys. Note fabricated bottom grid and mesh disc. All welding is of the highest quality.

Rolock equipment is engineered to suit the specific job . . . for maximum strength . . . for as high a ratio of load to weight as safety permits . . . for handling convenience . . . and for low hour-cost through extended service life. Our engineering department likes to solve problems. Tell us about yours!

SEND FOR CATALOG B-8.

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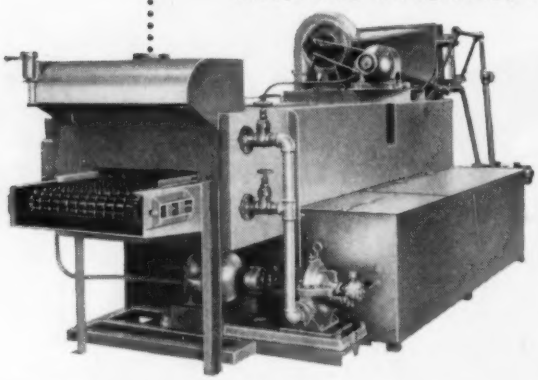
ROLOCK INC. • 1362 KINGS HIGHWAY, FAIRFIELD, CONN.

JOB-ENGINEERED for better work
Easier Operation, Lower Cost

10RL52

no job too complicated—
no job too unusual!

ALVEY-FERGUSON
WASHING MACHINES FOR INDUSTRY



This special purpose A-F Washing Machine was built for one of the nation's largest automobile plants to remove grease and chips from rocker arm shafts after the machining operation.

A unique feature is the special type of A-F Bar Conveyor unit which provides maximum washing and drying area.

For a discussion of latest metal parts cleaning methods, write today.

THE ALVEY-FERGUSON CO. 566 Disney St. Cincinnati 9, Ohio
Offices or representatives in principal cities

SCRAP
MAKES
EXTRA STEEL
FASTER

KEEP YOUR
SCRAP
MOVING

COLD FINISHED STEEL
Controlled CARBON and ALLOY

WYCKOFF STEEL COMPANY
FIRST NATIONAL BANK BUILDING · PITTSBURGH 30, PA.
3200 S. KEDZIE AVENUE · CHICAGO 23, ILLINOIS
Works: Ambridge, Pa. • Chicago, Ill. • Newark, N.J. • Putnam, Conn.

—Technical Briefs—

Steelmaking:

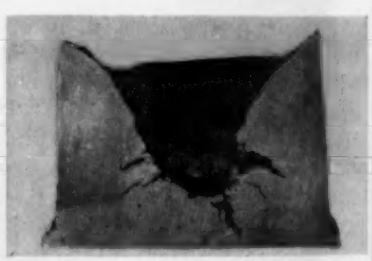
Teeming speed and ingot quality relationship described.

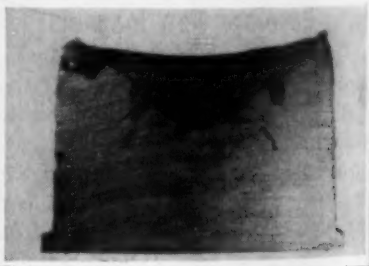
Effects of teeming speeds on ingot quality of structural steels were described recently by Dr. L. Reeve of Appleby-Frodingham Steel Co. at the 38th Annual Conference of the British Iron & Steel Research Assn.

Where teeming rate was controlled by nozzle size rather than throttling, mold filling time first decreased as nozzle wore, then increased as the head of metal in the ladle fell.

Skin Thickness — Influence of teeming rate upon quality was related to properties of the initial skin of the ingot, and the thickness which had solidified by the time the mold was filled, Dr. Reeve stated.

Generally, the more quickly the mold fell, the thinner this initial solid skin, and the greater the danger of ingot cracking. This was accentuated by hot steel and high sulfur steel. Killed steels were usually worse than balanced steels in this respect.





FEEDER HEADS of high speed steel ingots. Above, with solid tiles; below, feeder heads poured with recessed tiles.

Surface Troubles — Crack was reduced by slower teeming, but steel teemed too slowly might suffer from surface troubles due to

lapping and shell, particularly if teemed too cold.

In balanced and rimming steels, teeming rates affected ingot skin thickness. In general slower teeming rates and bottom pouring resulted in thicker skins.

Balanced Steels—A survey of balanced steel ingot skin structures indicated slower teeming tended to thicken the skin of medium thick skinned steels but had little influence on skin thickness of very thin skinned balanced steels produced by a greater degree of ladle de-oxidation.

The extremely thin skin suggested an almost complete suppression of rimming action, which could not be influenced by slowing up of teeming rate.

Nozzle Size—Study of 216 casts of balanced steel sampled for ingot corner structure confirmed that small nozzles resulted in thicker skins and longer blowholes than larger nozzles.

In the case of the smaller 4- and 6-ton ingots used for structural sections it appeared that large nozzles produced more defectives, particularly when in conjunction with very hot (or very cold) steel, and when sulfur was high.

Range Finder:

Tank gunners zero in for direct hit first time with new unit.

A new tank gun range finder for use in the M47 medium tank, permits the tank gunner to zero in on the target and make his first target a direct hit. The unit, which automatically sets the gun for the required distance to target, is manufactured by Airtemp Div. of Chrysler Corp., Dayton.

Airtemp, which now holds three large orders for the range finder, was able to ship the first unit within 6 months from the time fire control division of Army Ordnance placed its first order.

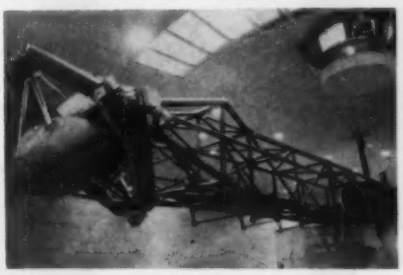
Optical glass is bonded directly to metal mounts without mechanical fasteners. The entire instrument must be hermetically sealed against atmosphere.

Human Centrifuge:

Effects on human body of supersonic flight will be studied.

Human tolerances to acceleration and a study of physiological systems will get first priority in research on the recently completed human centrifuge. Called the world's largest, the machine is operating at the Naval Aviation Medical Acceleration Laboratory, Johnsville, Pa.

The centrifuge is powered by one of the largest vertical dc motors ever built. The huge General



OUTSIZE CENTRIFUGE is rotated by direct connection to 80-ton rotor of a giant motor set in base, lower right. Machine is located at Naval Air Development Center, Johnsville, Pa.

HUMAN GUINEA PIG sits in gondola of centrifuge with hatch open. Wires and instruments record respiration, heart rate, blood pressure, heart and brain waves. Car can be depressurized to equivalent of 60,000 ft altitude.

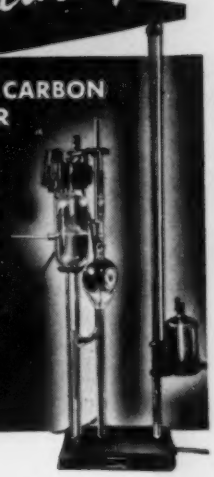
Electric 180-ton drive has a rating of 4000 hp and can develop 16,000 hp momentarily at 48 rpm.

Aluminum Gondola—A spheroidal aluminum gondola is suspended in double gimbals which can be rotated by motors. A man seated in the car can be somersaulted or tipped into any position while he is swept around the large circle described by the arm.

CARBON and SULFUR ANALYSIS with Speed! Ease! Accuracy!

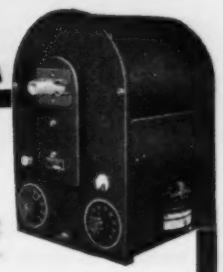
TWO MINUTE CARBON DETERMINATOR

High degree of accuracy assured by: fan cooling gases, leveling to meniscus line, automatically maintaining atmospheric pressure, wide selection of carbon percentage scales. Accurate within 0.002% on low range Burette.



THREE MINUTE SULFUR DETERMINATOR

Determination in accordance with A.S.T.M. specification accuracy within 0.002% inorganic or organic materials. Simple procedure.



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Sturdy construction with HIGHEST QUALITY insulation.

Use 3031D Boats and Zircotubes to reduce operating cost of analysis.

Use Dietert-Detroit Carbon and Sulfur Determinators for Economical Analyses
Write to Dept. S-1 for descriptive literature

CONTROL EQUIPMENT
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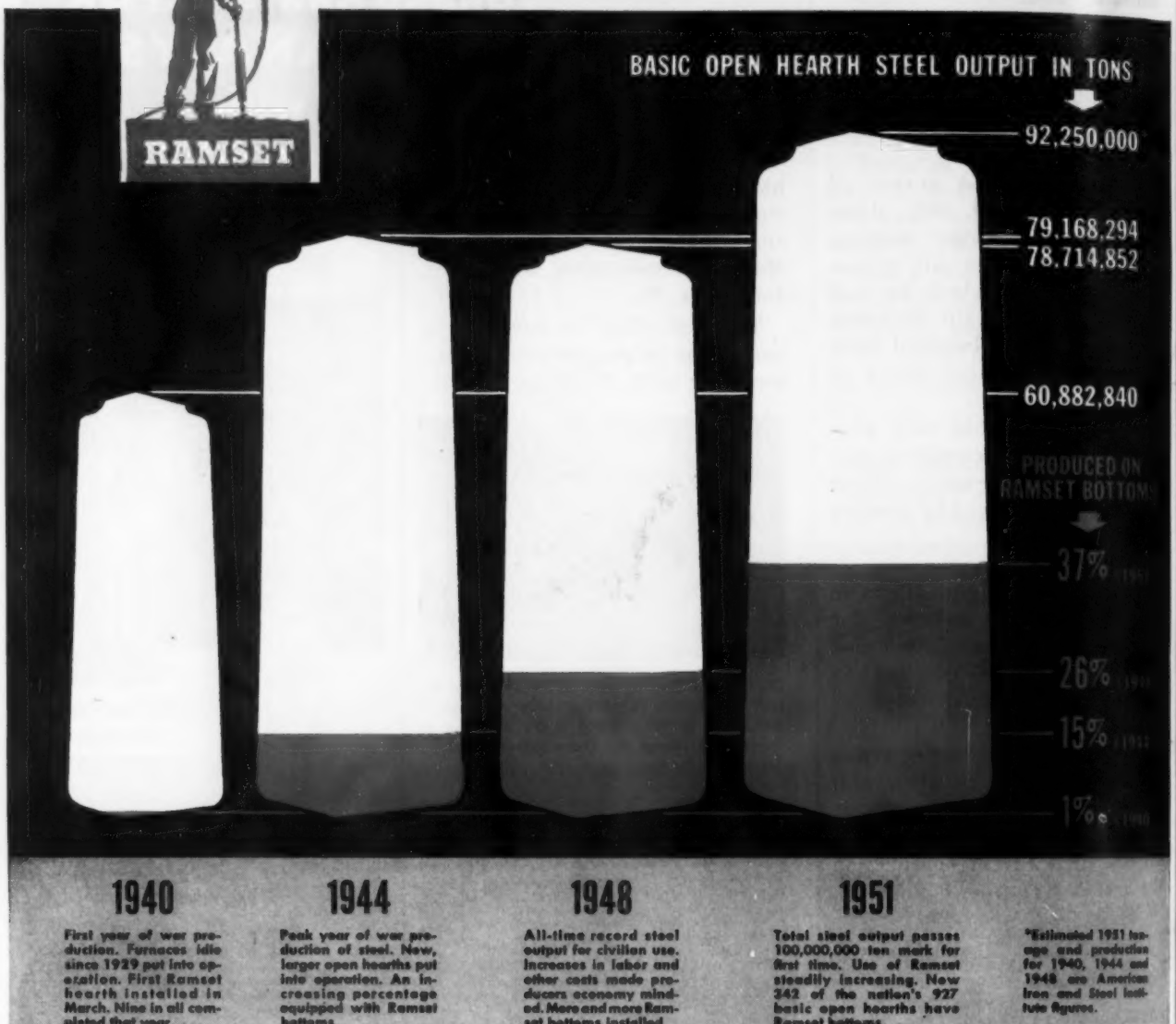
9330 ROSELAWN • DETROIT 4, MICH.

GROWTH OF A GOOD IDEA


RAMSET
BASIC OPEN HEARTH STEEL OUTPUT IN TONS
92,250,000
79,168,294
78,714,852
60,882,840
PRODUCED ON RAMSET BOTTOMS
37%
26%
15%
1%
1940
First year of war production. Furnaces idle since 1929 put into operation. First Ramset hearth installed in March. Nine in all completed that year.
1944
Peak year of war production of steel. New, larger open hearths put into operation. An increasing percentage equipped with Ramset bottoms.
1948
All-time record steel output for civilian use. Increases in labor and other costs made producers economy minded. More and more Ramset bottoms installed.
1951
Total steel output passes 100,000,000 ton mark for first time. Use of Ramset steadily increasing. Now 342 of the nation's 927 basic open hearths have Ramset bottoms.
*Estimated 1951 tonnage and production for 1940, 1944 and 1948 are American Iron and Steel Institute figures.

STEEL production has nearly doubled since 1940, yet the number of open hearth furnaces has actually dropped. Larger capacities of the newer furnaces tell only part of the story. A major factor has been increased efficiency in the use of existing equipment.

Basic Refractories is proud to have contributed to this increased efficiency through the development of Ramset. Introduced in 1940 the use of this magnesia ramming mix has steadily increased until now over a third of all basic open hearths have Ramset bottoms.

There are three principal reasons why more and more rammed hearths are in use: (1) The refractory itself is right for the job—constantly improved through Basic research with the cooperation of practical steel makers; (2) Ramset rammed hearths save time, fuel, labor and brickwork compared with the traditional burned-in magnesite; (3) Correct installation procedure is supervised by skilled Basic engineers employing specially designed equipment.

We look forward to the continuing opportunity to serve the industry with more Ramset bottoms, thus to help produce more efficiently the increased tonnage of steel demanded for defense and civilian needs.

BASIC FURNACE REFRACTORIES

Basic Refractories Incorporated

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Write for free booklet "Underlying Steel". This graphic booklet tells the story in words and pictures of granular basic refractories and their role in the production of open hearth steel. Address Dept. 14.

Exclusive Agents in Canada: REFRACTORIES ENGINEERING AND SUPPLIES, LTD., Hamilton and Montreal

Banned WSB Recommendation Wilting Economy

Strike losses soar . . . Big Six sound note of finality . . . The union shop still stalling production . . . WSB belatedly stripped of such non-economic authority . . . Taft-Hartley last hope.

The sixth week of the steel strike finds industry gasping for breath—with no hope of early release from the steel vacuum. One by one manufacturing plants—both defense and civilian—are retiring from the production picture. And still nothing is being done to get production started again.

The steel companies and the union are as hopelessly deadlocked as ever over the non-economic issue of the union shop. The last secret meeting of the Big Six steel companies ended with a note of finality—they would never surrender the union shop.

Finagling—That the union shop issue in the steel industry should be strangling a good part of the U. S. economy, including important defense production, is utterly ridiculous. It is even more ridiculous because the union case is based on a Wage Stabilization Board recommendation. In the beginning WSB was not empowered to rule on such non-economic issues. It got this power only after labor "walked out" and President Truman went over former Defense Mobilizer Charles Wilson's head. Since the controversial steel recommendations Congress has stripped WSB of such powers. Another labor "strike" may yet come against government stabilization policy.

Thus the only big issue in the steel case can be traced to a government mistake caused by union pressure.

The Damage—The nation's manufacturing plants are in a desperate plight. Steel losses by the end of this week will total 13.2 million ingot tons. Total losses from strikes since World War II are now placed at about 40 million tons.

By the end of this week the auto industry will be at least 70 pct idle. Auto companies are hustling feverishly to finish every chassis they have started. This is exhausting their parts supply lines as well as their inventory on hand. Even if the steel strike were settled immediately the auto industry would be flat on its face for at least 3 or 4 weeks.

Lake ore shipments already lost make a supply crisis late next winter appear certain. Each day of lost shipment costs almost 2 days of iron ore supply. This is because normally the shipping season is 7 months long. Each day of ore shipment takes care of 1 day of steel production now, plus stockpiling 5/7 of a day for winter needs. Large scale ore movement by rail is not feasible. In addition to the great expense, the freezing of ore in cars has never been overcome.

False Alarm — Steel emergency measures short of settling the strike are practically worthless. The plan to re-open a few selected struck plants has been abandoned. Though it would have proven very costly, steel firms expressed willingness to go through with it. The plan had to be abandoned partly because it was not feasible and partly because of union bickering over what plants should be opened and what workers should get paid.

The union has also sabotaged the plan to ship finished steel for defense work from struck plants. In several cases bitter controversy arose over who should handle the steel. The union insisted that only union men should do this work. The companies insisted that the regular crews should handle the steel—even though some workers did not belong to the union. Meanwhile defense production lines are grinding to a halt for lack of steel.

Only Hope — The only visible means of ending the strike is use of the Taft-Hartley Law by President Truman. So far the only hint from him is that he will not use it. How long he can maintain this position in the face of a wilting economy remains to be seen. It will be recalled that the reason for his controversial seizure of the industry last April the 8th was the grave emergency. The emergency is even more serious now.

Outlook Changed—All pre-strike predictions of the steel market are now out the window. A very tight market is now expected into the first part of 1953. Steel inventories and supply lines have been drained. After the strike ends it will take at least 2 weeks to resume shipments—even to high priority customers. On some products new business probably can't be taken before the first quarter of 1953. This is determined by adding lead time, days lost by strike, and pre-strike carry-over orders. Large sized bars, heavy plates and structurals, and some oil country goods fall in this category.

Steelmaking operations this week are scheduled at 14.5 pct of capacity, up one point.

Scrap — Despite sporadic sales to steel mills still operating, the scrap market was becalmed this week. A large consumer in Pittsburgh stabilized the market there with a purchase of openhearth scrap at $40 per ton delivered. This pushed up THE IRON AGE scrap steel composite to $39.50 from last week's figure of $39.17.

Giving a lift to the West

THE needs of western industry call for immense quantities of Kaiser Steel Pipe . . . which is used in a wide variety of ways.

For example, Kaiser Steel Pipe is required for such diverse uses as hydraulic car lifts, pump columns, structural columns, feeder lines, residential gas mains, pipelines to transport gas, oil and water.

Kaiser Steel Pipe is also used for plumbing, heating and ventilating systems in homes, schools, hotels, apartments and factories.

To meet all these needs, Kaiser Steel produces a complete range of pipe as part of its diversified line of steel products . . . providing a nearby, dependable source for industries that serve you.

It's good business to do business with

Kaiser Steel

built to serve the West

PROMPT, DEPENDABLE DELIVERY AT COMPETITIVE PRICES • plates • continuous weld pipe • electric weld pipe • hot rolled strip • hot rolled sheet alloy bars • carbon bars • structural shapes • cold rolled strip • special bar sections • semi-finished steels • pig iron • coke oven by-products
For details and specifications, write: **KAISER STEEL CORPORATION, LOS ANGELES, OAKLAND, SEATTLE, PORTLAND, HOUSTON, TULSA, NEW YORK**

Market Briefs

Price Boost—On the heels of its agreement with the union, Pittsburgh Steel Co. tacked a 2.6 pct boost on all invoices. Effective date of the price hike was June 30. The increase covers Capehart Amendment allowances up to the increased cost of labor. The company has applied to Office of Price Stabilization for a total $8.16 increase, but the agency will consider no such price relief until the end of the national strike.

Railroads Hurt—Effects of the steel strike continued to be felt by the railroads as car loadings during the last week in June fell 21 pct behind the same period in 1951. About two-thirds of the lost freight resulted from drastically reduced shipments of ore, coal and coke.

Coal Hike?—Earnings standard criteria will be applied to anthracite coal industry statistics by government price-setters to determine whether producers are eligible for a 75¢ per ton increase on smaller sizes. Industry spokesmen have complained that some producers have been forced out of business by rising costs. Production of all sizes of anthracite costs $10.65 per ton on the average, f.o.b. mine, industry claims. If a price boost is granted, price differentials between No. 1 buckwheat and smaller sizes will be continued.

Scrap Premium—Office of Price Stabilization has established a new content basis for premium nickel alloy scrap effective July 12. Under the new ruling, minimum nickel content requirement has been set at not less than half of 1 pct and the maximum at not more than 7 pct. Previously OPS had not allowed premium charges for scrap containing less than 1 pct or more than 5.25 pct nickel.

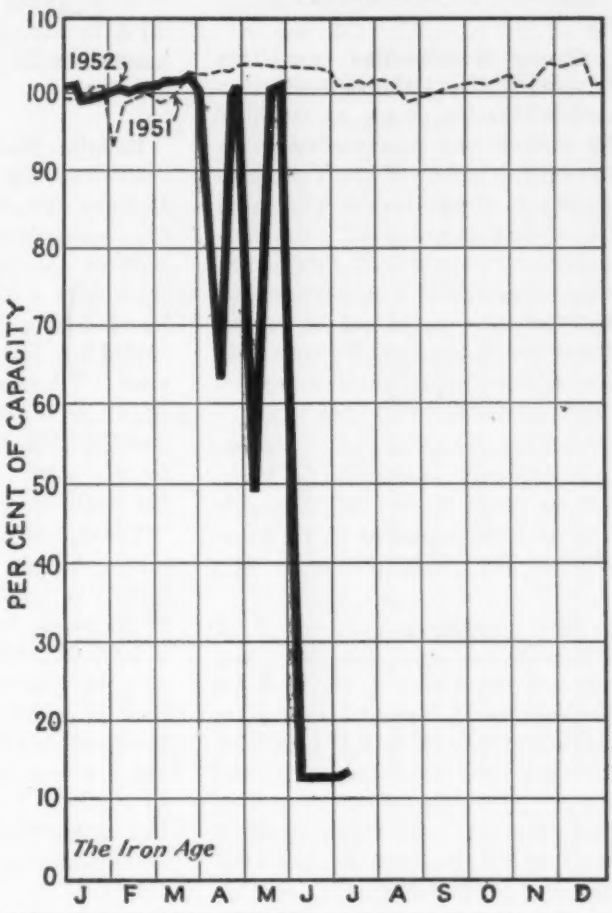
More Orders—Backlog of unfilled orders placed with contract tool and die shops increased during the second quarter, resuming an upward trend halted briefly during the first quarter. Deliveries from contract tool and die shops to date are 54 pct ahead of last year's pace.

Order Lag—Freight car manufacturers report new orders running far behind deliveries. Orders received in April and May amounted to 2899 as contrasted to 14,620 deliveries for the same period. January order backlog of 120,251 had been cut to 103,910 on May 1. Builders intend to continue production regardless of the order lag and hope to sell the cars later.

Farm Equipment—Export-Import Bank has agreed to finance Brazilian importation of $5 million worth of American-made agricultural equipment. Brazilian distribution of this equipment will be confined largely to the State of Minas Gerais to aid a program of agricultural development. Repayment will be made in ten semi-annual installments at 4 pct interest.

Export Ban Lifted—Exports of synthetic butyl rubber will be permitted during the third quarter for the first time in more than 2 years. An export quota of 2500 long tons has been established for this period.

Steel Operations



District Operating Rates—Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	West	Buffalo	Cleveland	Detroit	Wheeling	South	Ohio River	St. Louis	East	Aggregate
June 29	6.0	7.0	7.0	16.0	23.5*	0.5	0.0	39.0*	51.0	3.5	36.5	50.0	14.0	13.5
July 6	8.0	8.5	11.0	16.0	20.0	0.5	0.0	40.0	50.0	3.5	33.0	33.5	14.0	14.5

Beginning Jan. 1, 1952, operations are based on annual capacity of 108,587,670 net tons.
* Revised.

Favor New U. S. Aluminum Producers

Committee strongly opposes Canadian proposal . . . Wants nonintegrated newcomers . . . W. Va. smelter would meet approval . . . May remove some controls this year—*By R. L. Hatschek.*

Last week Sen. Burnet R. Maybank's joint watchdog committee made its recommendations on the subject of purchasing Canadian aluminum. It is opposed to getting metal from above the border. The report was quite outspoken in favoring new producers in this country as the best source of additional supplies of the light metal.

Strong Words—The committee advocates "that Defense Production Administration devote as much of its energy and resourcefulness to the establishment of new U. S. producers as it has to the Aluminum Co. of Canada proposal." A combination of independent fabricators was suggested if a non-integrated new producer could not be set up for economic reasons. A year's wait was advised before making any decision on further requirements.

General flavor of the whole report was quite optimistic for backers of Sen. Harley M. Kilgore's plan to build a smelter in his home state of West Virginia (see p. 94).

NPA Considers — Removal of controls from aluminum foil, powder and paste may be the first for the light metal. National Production Authority is mulling this over with industry vigorously patting the agency on the back for having such thoughts. Industry representatives are also in favor of decontrolling aluminum wire and cable as soon as possible. How soon any action may be taken is anybody's guess but it should be fairly soon on the first named products.

Current allocations of aluminum are at 55 pct of the first half 1950 base period with up to 75 pct allowed in certain hardship cases. Producers are plugging away at NPA to have the basic allotments boosted to 85 pct for the fourth quarter.

Rebuild Stockpile — Samuel W. Anderson, top aluminum man in Defense Production Administration, wants the aluminum stockpile built up once again. He points out that quite a bit of metal was released during the extreme shortage period late last year and early this year. DPA plans call for increasing stocks by 15,500 tons in the fourth quarter. Mr. Anderson calls this a modest start toward replenishing the stockpile.

The industry's Washington committee doesn't quite see eye to eye with Mr. Anderson on the urgency of the move. Rather, they proposed a delay to first quarter 1953 of the new stockpiling effort and qualified that by saying it should be delayed until second quarter if new plants did not meet production schedules as planned. They'd also like to see the government take high-iron aluminum until the new plants get better control, eventually replacing it with purer stuff.

Paley on Aluminum — Outlook for aluminum in 1975 is optimistic, according to the second volume of the Paley report. U. S. use of the metal may run to 3.6 million tons by that time with raw materials still in fine shape. But, it said, it would still be a good idea to conserve domestic supplies of bauxite.

Stockpiles of both metal and ore were advocated. A long-term tieup between government and aluminum was forecast. Military demands will be running higher than civil.

Scrap Tariffs — The Senate and House passed a bill extending the scrap metal tariff suspension for all metals but lead. Earlier the House had passed the measure, including lead. Then it approved the Senate amendment. The bill which extends the 2-year-old tariff suspension to June 30, 1953, now awaits the President's signature.

More Magnesium—As a result of an agreement to supply Great Britain with 2640 tons of magnesium a year for 20 years, Aluminum Co. of Canada plans to increase its Arvida output of magnesium from 3000 tons a year to 4000 tons. Anticipated cost of the program will be $2 million.

In Nonferrous, Too—Conflicting opinions on Wage Stabilization Board decisions in labor-management disputes in three Salt Lake City lead and zinc mining companies are now available from WSB. CIO United Steelworkers were on one side and Metals Reduction Co., New Park Mining Co. and U. S. Smelting, Refining & Mining Co. on the other.

In a June 20 decision, the Board approved an 8¢ general wage adjustment for 1000 workers as recommended by a special panel, but reduced certain other recommendations. These disputes were voluntarily submitted to WSB after collective bargaining had failed.

NONFERROUS METAL PRICES

	July 2	July 3	July 4	July 5	July 7	July 8
Copper, electro, Conn.	24.50	24.50	....	24.50	24.50	24.50
Copper, Lake delivered	24.625	24.625	....	24.625	24.625	24.625
Tin, Straits, New York	$1.215	$1.215	....	....	$1.215	$1.215
Zinc, East St. Louis	15.00	15.00	....	15.00	15.00	15.00
Lead, St. Louis	15.80	15.80	....	15.80	15.80	15.80

Note: Quotations are going prices.

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt. frt. allowed)

Flat Sheet: 0.188 in., 2S, 3S, 30.1¢; 4S, 61S-O, 32¢; 52S, 34.1¢; 24S-O, 24S-OAL, 32.9¢; 75S-O, 75S-OAL, 39.9¢; 0.081 in., 2S, 3S, 31.2¢; 4S, 61S-O, 33.5¢; 52S, 35.6¢; 24S-O, 24S-OAL, 34.1¢; 75S-O, 75S-OAL, 41.8¢; 0.032 in., 2S, 3S, 32.9¢; 4S, 61S-O, 37.1¢; 52S, 39.3¢; 24S-O, 24S-OAL, 41.7¢; 75S-O, 75S-OAL, 52.2¢.

Plate ¼ in. and heavier: 2S, 3S-F, 28.3¢; 4S-F, 30.2¢; 52S-F, 31.8¢; 61S-O, 30.8¢; 24S-O, 24S-OAL, 32.4¢; 75S-O, 75S-OAL, 38.3¢.

Extruded Solid Shapes: shape factors 1 to 5, 36.2¢ to 74.5¢; 12 to 14, 36.9¢ to 89¢; 24 to 26, 39.6¢ to $1.16; 36 to 38, 47.2¢ to $1.70.

Rod, Rolled: 1.5 to 4.5 in., 2S-F, 3S-F, 37.5¢ to 38.5¢; cold finished, 0.375 to 3 in., 2S-F, 3S-F, 40.5¢ to 36¢.

Screw Machine Stock: Rounds, 11S-T3, ⅛ to 11/32 in., 53.5¢ to 42¢; ⅜ to 1½ in., 41.5¢ to 39¢; 1 9/16 to 3 in., 38.5¢ to 36¢; 17S-T4 lower by 1.5¢ per lb. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in., 2S, 39.5¢ to 29¢; 52S, 48¢ to 35¢; 56S, 51¢ to 42¢; 17S-T4, 54¢ to 37.5¢; 61S-T4, 48.5¢ to 37¢; 75S-T6, 84¢ to 67.5¢.

Extruded Tubing, Rounds: 63S-ST-5, OD in in.: 1¼ to 2, 37¢ to 54¢; 2 to 4, 33.5¢ to 45.5¢; 4 to 6, 34¢ to 41.5¢; 6 to 9, 34.5¢ to 43.5¢.

Roofing Sheet, Flat: 0.019 in. x 28 in. per sheet, 72 in., $1.42; 96 in., $1.522; 120 in., $1.902; 144 in., $2.284. Gage 0.24 x 28 in., 72 in., $1.379; 96 in., $1.839; 120 in., $2.299; 144 in., $2.759. **Coiled Sheet:** 0.019 in. x 28 in., 28.2¢ per lb; 0.024 in. x 28 in., 26.9¢ lb.

Magnesium

(F.O.B. mill, freight allowed)

Sheet and Plate: FS1-O, ¼ in., 63¢; 3/16 in., 65¢; ⅛ in., 67¢; B & S Gage 10, 68¢; 12, 72¢. Specification grade higher. Base: 30,000 lb.

Extruded Round Rod: M, diam in., ¼ to 0.311 in., 74¢; ⅓ to ¾ in., 57.5¢; 1¼ to 1.749 in., 53¢; 2½ to 5 in., 48.5¢. Other alloys higher. Base up to ¾ in. diam, 10,000 lb; ¾ to 2 in., 20,000 lb; 2 in. and larger, 30,000 lb.

Extruded Solid Shapes, Rectangles: M. In weight per ft, for perimeters less than size indicated, 0.10 to 0.11 lb, 3.5 in., 62.3¢; 0.22 to 0.25 lb, 6.9 in., 59.3¢; 0.50 to 0.59 lb, 8.6 in., 56.7¢; 1.8 to 2.59 lb, 19.5 in., 53.8¢; 4 to 6 lb, 28 in., 49¢. Other alloys higher. Base, in weight per ft of shape: Up to ½ lb, 10,000 lb; ½ to 1.80 lb, 20,000 lb; 1.80 and heavier, 30,000 lb.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057; ¼ in. to 5/16, $1.40; 5/16 to ⅜, $1.26; ½ to ⅝, 93¢; 1 to 2 in., 76¢; 0.165 to 0.219, ⅝ to ¾, 61¢; 1 to 2 in., 57¢; 3 to 4 in., 56¢. Other alloys higher. Base, OD in in.: Up to 1½ in., 10,000 lb; 1½ in. to 3 in., 20,000 lb; 3 in. and larger, 30,000 lb.

Titanium

(10,000 lb base, f.o.b. mill)

Commercially pure and alloy grades: Sheets and strip, HR or CR, $15; Plate, HR, $12; Wire, rolled and/or drawn, $10; Bar, HR or forged, $6; Forgings, $6.

Nickel and Monel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel
Sheets, cold-rolled	77	60½
Strip, cold-rolled	83	63½
Rods and bars	73	58½
Angles, hot-rolled	73	58½
Plates	75	59½
Seamless tubes	106	93½
Shot and blocks	..	53½

Copper, Brass, Bronze

(Freight prepaid on 200 lb)

	Sheet	Rods	Extruded Shapes
Copper	45.52	....	45.12
Copper, h-r	....	41.37	....
Copper, drawn	....	42.62	....
Low brass	42.34	42.03	....
Yellow brass	40.17	39.86	....
Red brass	43.10	42.79	....
Naval brass	44.72	38.78	40.04
Leaded brass	....	....	38.02
Com'l bronze	44.39	44.08	....
Mang. bronze	48.44	42.83	43.89
Phos. bronze	64.72	64.97	....
Muntz metal	42.69	38.25	39.50
Ni silver, 10 pct	51.96	54.18	....

PRIMARY METALS

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed	19.00
Aluminum pig	18.00
Antimony, American, Laredo, Tex.	39.00
Berrylium copper, 3.75-4.25% Be	$1.56
Beryllium aluminum 5% Be, Dollars per lb contained Be	$69.50
Bismuth, ton lots	$2.25
Cadmium, del'd	$2.25
Cobalt, 97-99% (per lb)	$2.40 to $2.47
Copper, electro, Conn. Valley	24.50
Copper, Lake, delivered	24.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$200
Lead, St. Louis	15.80
Lead, New York	16.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb.	24.50
Magnesium, sticks, 100 to 500 lb.	42.00 to 44.00
Mercury, dollars per 76-lb flask, f.o.b. New York	$192-195
Nickel electro, f.o.b. N. Y. warehouse	59.58
Nickel oxide sinter, at Copper Creek, Ont., contained nickel	52.75
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$90 to $93
Silver, New York, cents per oz.	82.75
Tin, New York	$1.215
Titanium, sponge	$5.00
Zinc, East St. Louis	15.00
Zinc, New York	15.83
Zirconium copper, 50 pct	$6.20

REMELTED METALS

Brass Ingot

(Cents per lb, delivered carloads)

85-5-5-5 ingot	
No. 115	27.25
No. 120	26.75
No. 123	26.25
80-10-10 ingot	
No. 305	33.00
No. 315	30.50
88-10-2 ingot	
No. 210	41.50
No. 215	40.00
No. 245	34.50
Yellow ingot	
No. 405	23.25
Manganese bronze	
No. 421	30.50

Aluminum Ingot

(Cents per lb, 10,000 lb and over)

95-5 aluminum-silicon alloys	
0.30 copper, max.	20.6
0.60 copper, max.	20.4
Piston alloys (No. 122 type)	21.2
No. 12 alum. (No. 2 grade)	19.5
108 alloy	20.6
195 alloy	20.8
13 alloy	20.8
ASX-679	20.5
Steel deoxidizing aluminum, notch-bar granulated or shot	
Grade 1—95-97½%	18.80
Grade 2—92-95%	18.60
Grade 3—90-92%	18.40
Grade 4—85-90%	18.20

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, freight allowed, 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	37.84
Electrodeposited	33¾
Flat rolled	38.34
Forged ball anodes	43
Brass, 80-20	
Cast, oval, 15 in. or longer	34¾
Zinc, oval	26½
Ball, anodes	25½
Nickel, 99 pct plus	
Cast	76.00
Rolled, depolarized	77.00
Cadmium	$2.40
Silver 999 fine, rolled, 100 oz lots, per troy oz, f.o.b. Bridgeport, Conn.	97½

Chemicals

(Cents per lb, f.o.b. shipping points)

Copper cyanide, 100 lb drum	63
Copper sulfate, 99.5 crystals, bbl.	12.85
Nickel salts, single or double, 4-100 lb bags, frt. allowed	20½
Nickel chloride, 375 lb drum	27½
Silver cyanide, 100 oz lots, per oz.	67¼
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc cyanide, 100 lb drum	47.7

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add ⅛¢ per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	21⅛	20¾
Yellow brass	19⅛	17⅞
Red brass	20¼	19⅜
Comm. bronze	20⅛	19¾
Mang. bronze	18½	17¾
Brass rod ends	18⅞	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
Refinery brass	17.25*
Radiators	14.75

* Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper wire	19.25
No. 2 copper wire	17.75
Light copper	16.50
No. 1 composition	18.50
No. 1 comp. turnings	18.25
Rolled brass	15.50
Brass pipe	16.50
Radiators	14.75
Aluminum	
Mixed old cast	9.75
Mixed new clips	11.00
Mixed turnings, dry	9.50
Pots and pans	9.25

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire	18¾—19¼
No. 2 heavy copper and wire	17 —17½
Light copper	15½—16
New type shell cuttings	15½—16
Auto radiators (unsweated)	14 —14¼
No. 1 composition	17½—18
No. 1 composition turnings	17 —17½
Unlined red car boxes	16½—17
Cocks and faucets	15 —15½
Mixed heavy yellow brass	11½—12
Old rolled brass	14½—15
Brass pipe	15½—16
New soft brass clippings	16 —16½
Brass rod ends	15½—16
No. 1 brass rod turnings	15 —15½

Aluminum

Alum. pistons and struts	6 — 6½
Aluminum crankcases	7 — 7½
2S aluminum clippings	10
Old sheet and utensils	7 — 7½
Borings and turnings	5 — 6
Misc. cast aluminum	7 — 7½
Dural clips (24S)	7 — 7½

Zinc

New zinc clippings	8
Old zinc	6
Zinc routings	3 — 3½
Old die cast scrap	5 — 5½

Nickel and Monel

Pure nickel clippings	35 —36
Clean nickel turnings	35 —36
Nickel anodes	35 —36
Nickel rod ends	35 —36
New Monel clippings	28 —29
Clean Monel turnings	20 —21
Old sheet Monel	28 —29
Nickel silver clippings, mixed	13 —14
Nickel silver turnings, mixed	12 —13

Lead

Soft scrap, lead	12 —12¼
Battery plates (dry)	7 — 7½
Batteries, acid free	4 — 5

Magnesium

Segregated solids	15 —16
Castings	14 —15

Miscellaneous

Block tin	100 —110
No. 1 pewter	70
No. 1 auto babbitt	55 —60
Mixed common babbitt	14½—14¾
Solder joints	19 —20
Siphon tops	60
Small foundry type	19 —19½
Monotype	15½—16
Lino. and stereotype	13½—14
Electrotype	12 —12½
Hand picked type shells	9¾—10
Lino. and stereo. dross	7
Electro. dross	6½

Big Build-up of Demand For Scrap?

Market is deadly calm right now . . . But future holds loud demand as mills must push to limit . . . Ore shortages will also put zip into market . . . Scrap committees dying out.

This may seem like playing Christmas carol records in July to ease the heat psychologically but even in these weeks of deadly calm for the market it is possible to see loud and insistent demand for scrap in future months. Prosperous stockpiles of scrap at steel plants must first be overcome but there are several factors lurking around, spawned by the strike, ready to do the hatchet job.

First of all scrap will become a more precious steel and iron making commodity when iron ore shortages developing now through tieups of the Great Lakes fleet strike early next year. Blast furnace grades should experience a spurt in popularity. If ore shortages shut down blast furnaces, the deficit of pig iron for steelmaking must be made up in scrap. Cast iron, spurned by buyers for months, will also see a revival as the pig iron supply is hurt.

The anticipated slowing down of the steelmaking rate which was anticipated for the fourth quarter of this year will never come about. The ingot rate must march right back to its highest levels and stay there to offset the loss of over 13 million tons of steel by the end of this week. That will be the backbone of scrap demand.

After the expected selling scramble at strike's end scrap prices should be fortified. They will inch back to ceiling levels as demand becomes more robust. Contributing to shortage possibilities is the demise of many scrap mobilization committees that fell by the wayside as scrap leaped back to fuller supply. Freeing of autowreckers from turnover regulations will also lower scrap take.

Pittsburgh—A large consumer stabilized the market here with a purchase of openhearth scrap at $40 per ton, delivered. While higher than a purchase by an independent mill last week, the market was still well below the OPS ceiling on openhearth grades. Consumers look for a depressed market here for perhaps 2 months after the steel strike ends.

Chicago—The scrap market here continued in poor shape with few purchases in most grades and dealers continuing to lay down scrap. The electric furnace market had split badly with sales at $2 below and a few tag end sales still going at ceiling. Reports of a $4 drop were not confirmed at press time. Cast scrap continued poor, despite reports of a firming in the market the previous week. Blast furnace grades stayed poor.

Philadelphia—The market this week was almost completely dead as a result of the Fourth of July holiday and plant vacation periods. Very little industrial scrap is being generated and scrap consumption is low in steel grades because of the strike, in cast grades because of vacation periods. Many scrap yard workers are also vacationing. Prices are unchanged with practically no sales.

New York—If anything, the scrap market here was deader than last week. Even a few foundries that had shown a limp interest last week deserted the market this week. Morrisville buying was still the biggest news. For lack of any market movement, prices maintained the status quo.

Detroit—Generation of scrap here came to virtual halt this week as auto and related plants ceased production. Scrap people are now starting to guess whether or not the scrap piles will be depleted at the strike's end before scrap emerges from plants again. There is some fear of making too many below-ceiling deals. Foundries are again showing activity. This has had a stabilizing effect on the cast market.

Cleveland—A Valley mill early this week purchased a fairly substantial tonnage of No. 2 heavy melting steel at $43 delivered for electric furnaces. This order called for a selected scrap containing no brass or copper impurities and is not normal openhearth No. 2. With the absence of any substantial mill buying of openhearth and blast furnace grades the market in Cleveland and Valley seemed weaker on appraisal this week. Turnings were down further.

St. Louis—It was a very dull week in the scrap trade with the July Fourth holiday and the steel strike. There were few if any sales. Excessive heat has hampered collection and processing. Because of the strike there is said to be considerable tonnage still outstanding at the ceiling prices. Very few items are still being quoted at ceilings.

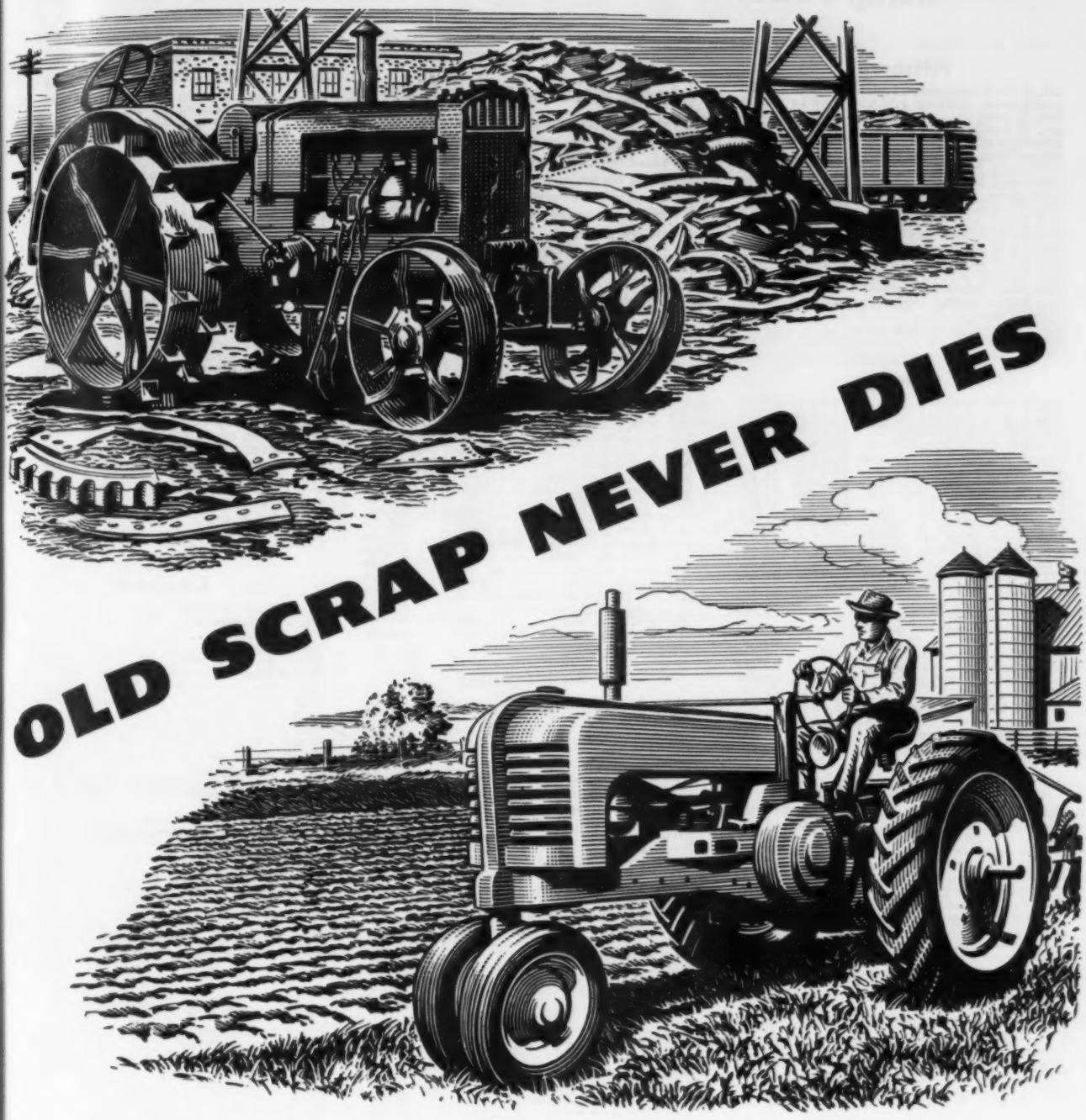
Birmingham—Despite reported price declines in other districts, most scrap dealers in the South are refusing to sell steel scrap below ceilings in the belief prices will advance when the mills reopen. A few who sold scrap to an eastern mill 2 weeks ago at $45 delivered this week turned down orders from the same mill of $40. Some electric furnace grades are being sold locally at ceilings. Cast scrap sales have picked up both locally and to eastern mills.

Cincinnati—One mill operating in the area is currently paying ceiling prices delivered for openhearth grades with a $1.50 per gross ton allowance for freight. No. 2 bundles are weak and are only being bought in limited quantities by this purchaser while blast furnace grades are being bought at ceiling prices delivered with no freight allowances. Another mill in the area is buying No. 2 heavy melting steel at $40 delivered.

Boston—The long weekend, vacations and the strike squashed the remaining life out of the local scrap market. Two minor price adjustments were made: Chemical borings down $1 to $2 and cupola cast up $2.

Buffalo—Flow of scrap into dealers' yards slackened as result of plant vacations and the steel strike. Yard stocks are of near record proportions. In addition about 10,000 tons is stored along the water front with 5000 tons more enroute via the canal from the East Coast.

West Coast—Cast dipped to $43 in Los Angeles last week but remained steady in Seattle and San Francisco in a slow market. Steelmaking scrap prices continued firm with no bargains offered by dealers. Producers in operation are buying slowly and working off large stockpiles.



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CLEVELAND, OHIO NEW YORK, N. Y. SAN FRANCISCO, CAL.
SEATTLE, WASH.

LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

*Scrap at basing point ceiling. Broker's fee not included.

†Scrap at shipping point ceiling. Broker's fee not included.

Pittsburgh

No. 1 hvy. melting	$39.00	to	$40.00
No. 2 hvy. melting	38.00	to	39.00
No. 1 bundles	39.00	to	40.00
No. 2 bundles	38.00	to	39.00
Machine shop turn.	27.00	to	27.50
Mixed bor. and ms. turns.	27.00	to	27.50
Shoveling turnings	....		31.00
Cast iron borings	32.00	to	33.00
Low phos. punch'gs, plate	....		46.50*
Heavy turnings	35.00	to	36.00
No. 1 RR. hvy. melting	....		46.00*
Scrap rails, random lgth.	....		48.00*
Rails 2 ft and under	....		52.00*
RR. steel wheels	....		51.00*
RR. spring steel	....		51.00*
RR. couplers and knuckles	....		51.00*
No. 1 machinery cast	....		52.00
Cupola cast	....		42.00
Heavy breakable cast.	....		45.00
Malleable	....		50.00

Chicago

No. 1 hvy. melting	$38.00	to	$39.00
No. 2 hvy. melting	37.00	to	38.00
No. 1 factory bundles	41.00	to	42.00
No. 1 dealers' bundles	38.00	to	40.00
No. 2 dealers' bundles	37.00	to	38.00
Machine shop turn.	25.00	to	26.00
Mixed bor. and turn.	29.00	to	30.00
Shoveling turnings	29.00	to	30.00
Cast iron borings	29.00	to	30.00
Low phos. forg crops	50.00	to	51.00
Low phos. punch'gs, plate	....		45.00*
Low phos. 3 ft and under	43.50	to	45.50
No. 1 RR. hvy. melting	....		44.50*
Scrap rails, random lgth.	....		46.50*
Rerolling rails	....		51.50*
Rails 2 ft and under	....		50.50*
Locomotive tires, cut	....		49.50*
Cut bolsters & side frames	....		47.50*
Angles and splice bars	....		49.50*
RR. steel car axles	....		56.50*
RR. couplers and knuckles	....		49.50*
No. 1 machinery cast	41.00	to	42.00
Cupola cast	39.00	to	40.00
Heavy breakable cast.	35.00	to	36.00
Cast iron brake shoes	....		41.00†
Cast iron car wheels	....		47.00†
Malleable	49.00	to	50.00

Philadelphia

No. 1 hvy. melting	$40.00	to	$41.00
No. 2 hvy. melting	38.00	to	39.00
No. 1 bundles	40.00	to	41.00
No. 2 bundles	38.00	to	39.00
Machine shop turn.	29.00	to	30.00
Mixed bor. and turn.	31.00	to	32.00
Shoveling turnings	31.00	to	32.00
Clean cast chem. borings	34.00	to	34.50
Low phos. punch'gs, plate	....		45.00*
Low phos. 3 ft and under	....		45.50*
Low phos. bundles	....		44.50*
Hvy. trimmings	....		41.50*
RR. steel wheels	....		49.50*
RR. spring steel	....		49.50*
Rails 18 in. and under	....		52.50*
Cupola cast	38.00	to	39.00
Heavy breakable cast.	41.00	to	42.00
Cast iron carwheels	....		47.00†
Malleable	....		55.00†
Unstripped motor blocks	34.00	to	35.00
Clean auto cast	45.00	to	46.00
Charging box cast	39.00	to	40.00

Cleveland

No. 1 hvy. melting	$39.00	to	$40.00
No. 2 hvy. melting	36.00	to	37.00
No. 1 busheling	39.00	to	40.00
No. 1 bundles	39.00	to	40.00
No. 2 bundles	36.00	to	37.00
Machine shop turn.	25.00	to	26.00
Mixed bor. and turn.	29.00	to	30.00
Shoveling turnings	29.00	to	30.00
Cast iron borings	29.00	to	30.00
Low phos. 2 ft and under	....		48.00*
No. 1 RR. hvy. melting	....		45.00*
Rails 3 ft and under	....		50.00*
Rails 18 in. and under	....		53.00*
No. 1 machinery cast	48.50	to	49.50
Cast iron carwheels	....		47.00†
Stove plate	45.00	to	46.00
Malleable	51.00	to	52.00

Youngstown

No. 1 hvy. melting	$40.00	to	$41.00
No. 2 hvy. melting	37.00	to	38.00
No. 1 bundles	40.00	to	41.00
No. 2 bundles	37.00	to	38.00
Machine shop turn.	26.00	to	27.00
Shoveling turnings	30.00	to	31.00
Cast iron borings	30.00	to	31.00
Low phos. plate	....		46.50*

Buffalo

No. 1 hvy. melting	$37.00	to	$38.00
No. 2 hvy. melting	37.00	to	38.00
No. 1 bushelings	38.00	to	39.00
No. 1 bundles	38.00	to	39.00
No. 2 bundles	37.00	to	38.00
Machine shop turn.	28.00	to	29.00
Mixed bor. and turn.	32.00	to	33.00
Shoveling turnings	32.00	to	33.00
Cast iron borings	32.00	to	33.00
Low phos. plate	....		45.50*
Scrap rails, random lgth.	....		47.00*
Rails 2 ft and under	....		51.00*
RR. steel wheels	....		50.00*
RR. spring steel	....		50.00*
RR. couplers and knuckles	....		50.00*
No. 1 machinery cast	....		45.00†
No. 1 cupola cast	40.00	to	41.00
Small indus. malleable	....		55.00†

Birmingham

No. 1 hvy. melting	....		$38.00*
No. 2 hvy. melting	....		38.00*
No. 1 bundles	....		39.00*
Electric furnace bundles	....		41.00*
No. 2 bundles	....		38.00*
No. 1 busheling	....		39.00*
Machine shop turn.	....		29.00*
Shoveling turnings	....		33.00*
Cast iron borings	....		33.00*
Bar crops and plate	....		44.00*
Structural and plate, 2 ft.	....		44.00*
No. 1 RR. hvy. melting	....		41.00*
Scrap rails, random lgth.	....		43.00*
Rerolling rails	....		48.00*
Rails 2 ft and under	....		47.00*
Angles & splice bars	....		46.00*
Std. steel axles	....		53.00*
No. 1 cupola cast	$40.00	to	41.00
Stove plate	36.00	to	37.00
Cast iron carwheels	....		47.00†
Charging box cast	39.00	to	40.00
Heavy breakable	36.00	to	37.00
Drop broken machinery	42.00	to	43.00
Unstripped motor blocks	35.00	to	36.00

St. Louis

No. 1 hvy. melting	$37.50	to	$40.00
No. 2 hvy. melting	37.50	to	40.00
No. 2 bundled sheets	....		35.00
Machine shop turn.	....		26.00
Shoveling turnings	....		28.00
Rails, random lengths	....		45.00*
Rails 3 ft and under	....		50.00
Locomotive tires, uncut	....		48.00
Angles and splice bars	....		48.00*
Std. steel car axles	....		55.00*
RR. spring steel	....		48.00*
Cupola cast	....		40.00
Hvy. breakable cast.	....		38.00
Cast iron brake shoes	....		38.00
Stove plate	....		42.00
Cast iron car wheels	45.00	to	46.00
Malleable	....		50.00
Unstripped motor blocks	....		35.00

New York

Brokers' Buying prices per gross ton, on cars:

No. 1 hvy. melting	$33.00	to	$34.00
No. 2 hvy. melting	31.50	to	32.50
No. 2 bundles	31.50	to	32.50
Machine shop turn.	19.50	to	20.50
Mixed bor. and turn.	22.00	to	22.50
Shoveling turnings	22.00	to	22.50
Clean cast chem. borings	30.00	to	30.50
No. 1 machinery cast	41.00	to	42.00
Mixed yard cast.	33.00	to	35.00
Charging box cast.	36.00	to	38.00
Heavy breakable cast.	33.00	to	35.00
Unstrp. motor blocks	29.00	to	30.00

Boston

Brokers' Buying prices per gross ton, on cars:

No. 1 hvy. melting	$27.00	to	$28.00
No. 2 hvy. melting	27.00	to	28.00
No. 1 bundles	28.00	to	29.00
No. 2 bundles	27.00	to	28.00
No. 1 busheling	27.00	to	28.00
Machine shop turn.	....		17.00
Mixed bor. and turn.	....		17.00
Shoveling turnings	....		19.00
No. 1 busheling	27.00	to	28.00
Clean cast chem. borings	....		24.00
Mixed cupola cast.	33.00	to	34.00
Heavy breakable cast.	....		29.00
Stove plate	29.00	to	31.00

Detroit

Brokers' Buying prices per gross ton, on cars:

No. 1 hvy. melting	....		$39.20*
No. 2 hvy. melting	....		34.00
No. 1 bundles, openhearth	....		40.20*
No. 1 bundles, electric furnace	....		42.20*
New busheling	....		40.20*
Machine shop turn.	23.00	to	25.00
Mixed bor. and turn.	....		29.00
Shoveling turnings	....		29.00
Cast iron borings	....		29.00
Low phos. punch'gs, plate	....		42.70*
No. 1 cupola cast	....		46.00
Heavy breakable cast.	40.00	to	42.00
Stove plate	....		41.00
Automotive cast.	....		46.00
Cast iron brake shoes	....		39.00

Cincinnati

No. 1 hvy. melting	$40.50	to	$41.00
No. 2 hvy. melting	39.00	to	41.00
No. 1 bundles	40.50	to	41.00
No. 2 bundles	40.50	to	41.00
Machine shop turn.	28.50	to	29.50
Mixed bor. and turn.	33.50	to	34.50
Shoveling turnings	33.50	to	34.50
Cast iron borings	33.50	to	34.50
Low phos. plate	....		46.50*
Low phos. 2 ft and under	....		48.00*
Rails, random lengths	....		47.00*
Rails, 18 in. and under	....		53.00*
No. 1 cupola cast	46.00	to	47.00
Hvy. breakable cast.	39.00	to	40.00
Drop broken cast.	49.00	to	50.00

San Francisco

No. 1 hvy. melting	....		$34.00*
No. 2 hvy. melting	....		34.00*
No. 1 bundles	....		35.00*
No. 2 bundles	....		29.00
Machine shop turn.	....		20.00
Elec. fur. 1 ft and under	....		41.00*
No. 1 RR. hvy. melting	....		37.00*
Scrap rails random lgth.	....		39.00*
No. 1 cupola cast	....		42.00

Los Angeles

No. 1 hvy. melting	....		$34.00*
No. 2 hvy. melting	....		34.00*
No. 1 bundles	....		35.00*
No. 2 bundles	....		29.00
Mach. shop turn.	....		20.00
Elec. fur. 1 ft and under	....		41.00*
No. 1 RR. hvy. melting	....		37.00*
Scrap rails, random lgth.	....		39.00*
No. 1 cupola cast	....		43.00

Seattle

No. 1 hvy. melting	....		$34.00*
No. 2 hvy. melting	....		34.00*
No. 1 bundles	....		35.00*
No. 2 bundles	....		29.00
Elec. fur. 1 ft and under	....		41.00*
No. 1 RR. hvy. melting	....		37.00*
No. 1 cupola cast	....		36.50
Heavy breakable	....		32.00

Hamilton, Ont.

No. 1 hvy. melting	....		$35.00
No. 1 bundles	....		35.00
No. 2 bundles	....		34.50
Mechanical bundles	....		33.00
Mixed steel scrap	....		31.00
Mixed bor. and turn.	....		32.00
Rails, remelting	....		35.00
Rails, rerolling	....		33.00
Bushelings	....		30.00
Bush., new fact. prep'd.	....		33.00
Bush., new fact. unprep'd.	....		32.00
Short steel turnings	....		32.00
Cast scrap	....		50.00

Comparison of Prices

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Flat-Rolled Steel: (cents per pound)	July 8, 1952	July 1, 1952	June 10, 1952	July 10, 1951
Hot-rolled sheets	3.60	3.60	3.60	3.60
Cold-rolled sheets	4.35	4.35	4.35	4.35
Galvanized sheets (10 ga)	4.80	4.80	4.80	4.80
Hot-rolled strip	3.50	3.50	3.50	3.50
Cold-rolled strip	4.75	4.75	4.75	4.75
Plate	3.70	3.70	3.70	3.70
Plates wrought iron	.7.85	7.85	7.85	7.85
Stains C-R strip (No. 302)	36.75	36.75	36.75	36.75
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb.) cokes	$8.70	$8.70	$8.70	$8.70
Tinplate, electro (0.50 lb.)	7.40	7.40	7.40	7.40
Special coated mfg. ternes	7.50	7.50	7.50	7.50
Bars and Shapes: (cents per pound)				
Merchant bars	3.70	3.70	3.70	3.70
Cold finished bars	4.55	4.55	4.55	4.55
Alloy bars	4.30	4.30	4.30	4.30
Structural shapes	3.65	3.65	3.65	3.65
Stainless bars (No. 302)	31.50	31.50	31.50	31.50
Wrought iron bars	9.50	9.50	9.50	9.50
Wire (cents per pound)				
Bright wire	4.85	4.85	4.85	4.85
Rails (dollars per 100 lb)				
Heavy rails	$3.60	$3.60	$3.60	$3.60
Light rails	4.00	4.00	4.00	4.00
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$56.00	$56.00	$56.00	$56.00
Slabs, rerolling	56.00	56.00	56.00	56.00
Forging billets	66.00	66.00	66.00	66.00
Alloy blooms, billets, slabs	70.00	70.00	70.00	70.00
Wire Rod and Skelp: (cents per pound)				
Wire rods	4.10	4.10	4.10	4.10
Skelp	3.35	3.35	3.35	3.35

Pig Iron: (per gross ton)	July 8, 1952	July 1, 1952	June 10, 1952	July 10, 1951
Foundry, del'd Phila.	$58.19	$58.19	$58.19	$57.77
Foundry, Valley	52.50	52.50	52.50	52.50
Foundry, Southern, Cin'ti	55.58	55.58	55.58	55.58
Foundry, Birmingham	48.88	48.88	48.88	48.88
Foundry, Chicago†	52.50	52.50	52.50	52.50
Basic, del'd Philadelphia	57.27	57.27	57.27	56.92
Basic, Valley furnace	52.00	52.00	52.00	52.00
Malleable, Chicago†	52.50	52.50	52.50	52.50
Malleable, Valley	52.50	52.50	52.50	52.50
Charcoal, Chicago	70.56	70.56	70.56	70.56
Ferromanganese‡	186.25	186.25	186.25	186.25

†The switching charges for delivery to foundries in the Chicago district is $1 per ton.
‡Average of U. S. prices quoted on Ferroalloy pages.

Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$39.50	$38.50	$43.00*	$44.00*
No. 1 steel, Phila. area	40.50	40.50	41.50*	42.50*
No. 1 steel, Chicago	38.50	38.50	41.50*	42.50*
No. 1 bundles, Detroit	41.15*	41.15*	41.15*	41.15*
Low phos. Young'n	46.50*	46.50*	46.50*	46.50*
No. 1 cast, Pittsburgh	42.00	42.00	45.50	49.00†
No. 1 cast, Philadelphia	38.50	38.50	38.50	49.00†
No. 1 cast, Chicago	*39.50*	40.50	43.00	49.00†

*Basing pt., not including broker's fee.
†Shipping pt., not including broker's fee.

Coke: Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75	$14.75	$14.75	$14.75
Foundry coke, prompt	17.75	17.75	17.75	17.75

Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	24.50	24.50	24.50	24.50
Copper, Lake, Conn.	24.625	24.625	24.625	24.625
Tin, Straits, New York	$1.215	$1.215	$1.215	$1.06
Zinc, East St. Louis	15.00	15.00	16.00	17.50
Lead, St. Louis	15.80	15.80	14.80	16.80
Aluminum, virgin	19.00	19.00	19.00	19.00
Nickel, electrolytic	59.58	59.58	59.58	59.58
Magnesium, ingot	24.50	24.50	24.50	24.50
Antimony, Laredo, Tex.	39.00	39.00	39.00	42.00

Composite Prices

Starting with the issue of May 12, 1949, the weighted finished steel composite was revised for the years 1941 to date. The weights used are based on the average product shipments for the 7 years 1937 to 1940 inclusive and 1946 to 1948 inclusive. The use of quarterly figures has been eliminated because it was too sensitive. (See p. 139 of May 12, 1949, issue.)

	Finished Steel Base Price	Pig Iron	Scrap Steel
July 8, 1952	4.131¢ per lb.	$52.77 per gross ton	$39.50 per gross ton
One week ago	4.131¢ per lb.	52.77 per gross ton	39.17 per gross ton
One month ago	4.131¢ per lb.	52.77 per gross ton	42.00 per gross ton
One year ago	4.131¢ per lb.	52.69 per gross ton	43.00 per gross ton

	Finished Steel Base Price High	Finished Steel Base Price Low	Pig Iron High	Pig Iron Low	Scrap Steel High	Scrap Steel Low
1952	4.131¢ Jan. 1	4.131¢ Jan. 1	$52.77 May 2	$52.72 Jan. 1	$42.00 Jan. 1	$39.17 July 1
1951	4.131¢ Jan. 2	4.131¢ Jan. 2	52.72 Oct. 9	52.69 Jan. 2	47.75 Jan. 30	42.00 Oct. 23
1950	4.131¢ Dec. 1	3.837¢ Jan. 3	52.69 Dec. 12	45.88 Jan. 3	45.13 Dec. 19	26.25 Jan. 3
1949	3.837¢ Dec. 27	3.705¢ May 3	46.87 Jan. 18	45.88 Sept. 6	43.00 Jan. 4	19.33 June 28
1948	3.721¢ July 27	3.193¢ Jan. 1	46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
1947	3.193¢ July 29	2.848¢ Jan. 1	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.848¢ Dec. 31	2.464¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.464¢ May 29	2.396¢ Jan. 1	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.396¢	2.396¢	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.396¢	2.396¢	23.61	23.61	$19.17	$19.17
1942	2.396¢	2.396¢	23.61	23.61	19.17	19.17
1941	2.396¢	2.396¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$18.92 May 22
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.27207¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	32.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strips, representing major portion of finished steel shipment. Index recapitulated in Aug. 28, 1941, issue and in May 12, 1949.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		INGOTS		BILLETS, BLOOMS, SLABS			PIPE SKELP	PIL-ING	SHAPES STRUCTURALS		STRIP			
		Carbon Forging Net Ton	Alloy Net Ton	Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton		Steel Sheet	Carbon	Hi Str. Low Alloy	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy
EAST	Bethlehem, Pa.					$70.00 *B3*			3.70 *B3*	5.50 *B3*				
	Buffalo, N. Y.			$56.00 *B3*	$66.00 *B3, R3*	$70.00 *B3, R3*		4.45 *B3*	3.70 *B3*	5.50 *B3*	3.50 *B3, R3*	4.65 *B3*	4.95 *B3*	6.40 *B3*
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.				$73.00 *A2*	$77.00 *A2*					3.90 *A2*		5.55 *A2*	
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.			$56.00 *B3*	$66.00 *B3*	$70.00 *B3*			3.70 *B3*	5.50 *B3*	3.50 *B3*			
	Newark, N. J.													
	New Haven, Conn.											5.15 *A5* 5.85 *D1*		
	Phoenixville, Pa.								5.90 *P2*					
	Putnam, Conn.													
	Sparrows Pt., Md.										3.50 *B3*	4.65 *B3*	4.95 *B3*	6.40 *B3*
	Worcester, Mass.													
	Trenton, N. J.											6.00 *R4*		
MIDDLE WEST	Alton, Ill.										3.95 *L1*			
	Ashland, Ky.										3.50 *A7*			
	Canton-Massillon				$66.00 *R3*	$70.00 *R3* $66.00 *T5*								
	Chicago, Ill.			$56.00 *U1*	$66.00 *U1, R3,W8*	$70.00 *U1, R3,W8*		4.45 *U1*	3.65 *U1, W8*	5.50 *U1*	3.50 *A1, W8*	4.90 *A1, I3*		
	Cleveland, Ohio				$66.00 *R3*							4.65 *A5,J3*		6.55 *A5* 6.70 *J3*
	Detroit, Mich.		$54.00 *R5*		$69.00 *R5*	$73.00 *R5*					4.40 *M2* 3.80 *G3*	4.85 *G3* 5.45 *M2* 5.60 *R5,D1*	5.95 *G3*	
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana			$56.00 *U1*	$66.00 *U1*	$70.00 *U1, Y1*		4.45 *I3*	3.65 *U1, I3*	5.50 *U1, I3* 6.00 *Y1*	3.50 *U1, Y1,I3*	4.90 *I3*	5.30 *U1, I3* 5.80 *Y1*	
	Granite City, Ill.													
	Kokomo, Ind.													
	Middletown, Ohio											4.65 *A7*		
	Niles, Ohio Sharon, Pa.										4.00 *S1*	5.35 *S1*	5.40 *S1*	6.55 *S1*
	Pittsburgh, Pa.	$52.00 *U1*	$54.00 *U1, C11*	$56.00 *U1*	$66.00 *U1*	$70.00 *U1, C11*	3.35 *U1* 3.45 *J3*	4.45 *U1*	3.65 *U1, J3*	5.50 *U1, J3*	4.00 *S9,S7* 3.75 *A3* 3.50 *J3,A7*	4.65 *J3,A7* 5.00 *A3* 5.35 *B4,S7*		
	Portsmouth, Ohio													
	Weirton, Wheeling, Follansbee, W. Va.								3.90 *W3*		3.60 *W3*	4.65 *W3,F3*	5.75 *W3*	7.20 *W3*
	Youngstown, Ohio					$70.00 *Y1, C10*	3.35 *U1, R3*			6.00 *Y1*	3.50 *U1, R3, Y1*	4.65 *R3, Y1* 5.25 *C5,T4* 5.35 *B4*	5.30 *U1, R3* 5.80 *Y1*	6.55 *R3* 7.05 *Y1*
WEST	Fontana, Cal.	$79.00 *K1*	$80.00 *K1*	$75.00 *K1*	$85.00 *K1*	$89.00 *K1*			4.25 *K1*	6.10 *K1*	4.75 *K1*	6.30 *K1*	6.20 *K1*	6.95 *K1*
	Geneva, Utah				$66.00 *C7*				3.65 *C7*	5.50 *C7*				
	Kansas City, Mo.								4.25 *S2*		4.10 *S2*			
	Los Angeles, Calif.				$85.00 *B2*	$90.00 *B2*			4.25 *B2, C7*	6.05 *B2*	4.25 *B2,C7*	6.40 *C1*	6.05 *B2*	
	Minnequa, Colo.								4.10 *C6*		4.55 *C6*			
	San Francisco, Cal. Niles, Cal.				$85.00 *B2*				4.20 *B2* 4.56 *P9*	6.00 *B2*	4.25 *C7,B2*		6.05 *B2*	
	Seattle, Wash.	$73.00 *S11*			$85.00 *B2*				4.30 *B2*	6.10 *B2*	4.50 *B2*		6.30 *B2*	
SOUTH	Atlanta, Ga.										4.05 *A8*			
	Birmingham, Ala. Alabama City, Ala.			$56.00 *T2*	$66.00 *T2*				3.65 *R3,T2*	5.50 *T2*	3.50 *R3,T2*		5.30 *T2*	
	Houston, Texas		$62.00 *S2*		$74.00 *S2*	$78.00 *S2*			4.05 *S2*		3.90 *S2*			

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

STEEL PRICES

SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE	
Hot-rolled 18 ga. & hvyr.	Cold-rolled	Galvanized 10 ga.	Enameling 12 ga.	Long Terne 10 ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled 19 ga.		Coke* 1.25-lb. base box	Electro* 0.25-lb base box	Hollowware Enameling 29 ga.	
													Bethlehem, Pa.
3.60 *B3*	4.35 *B3*				5.40 *B3*	6.55 *B3*			4.10 *W6*				Buffalo, N. Y.
										† Special coated mfg ternes deduct 95¢ from 1.25-lb coke base box price. Can-making quality blackplate 55 to 128 lb, deduct $2.20 from 1.25-lb coke base box. * COKES: 1.50-/b, add 25¢. ELECTRO: 0.50-lb, add 25¢; 0.75-lb, add 65¢.			Claymont, Del.
													Coatesville, Pa.
4.00 *A2*					5.65 *A2*								Conshohocken, Pa.
													Harrisburg, Pa.
													Hartford, Conn.
									4.10 *B3*				Johnstown, Pa.
													Newark, N. J.
													New Haven, Conn.
													Phoenixville, Pa.
													Putnam, Conn.
3.60 *B3*	4.35 *B3*	4.80 *B3*			5.40 *B3*	6.55 *B3*	6.75 *B3*		4.20 *B3*	$8.55 *B3*	$7.25 *B3*		Sparrows Pt., Md.
									4.40 *A5*				Worcester, Mass.
									4.20 *R4*				Trenton, N. J.
									4.40 *L1*				Alton, Ill.
4.00 *A7*		4.80 *A7*	4.65 *A7*										Ashland, Ky.
		4.80 *R3*											Canton-Massillon
3.60 *W6*					5.40 *U1*				4.10 *A5,R3, N4*				Chicago, Ill.
3.60 *R3,J3*	4.35 *R3,J3*		4.65 *R3*		5.40 *R3,J3*	6.55 *R3,J3*			4.10 *A5*				Cleveland, Ohio
3.80 *G3* 3.40 *M3*	4.55 *G3*				5.95 *G3*	7.10 *G3*							Detroit, Mich.
													Duluth, Minn.
3.60 *U1, Y1,I3*	4.35 *U1, Y1,I3*	4.80 *U1,I3*	4.65 *U1,I3*	5.20 *U1*	5.40 *U1,I3* 5.90 *Y1*	6.55 *U1,I3* 7.05 *Y1*		5.40 *I3*	4.10 *Y1*	$8.45 *I3, U1, Y1*	$7.15 *U1,I3*	5.85 *U1* 5.30 *Y1*	Gary, Ind. Harbor, Indiana
3.30 *G2*	5.05 *G2*	5.50 *G2*	5.35 *G2*								$7.35 *G2*	6.05 *G2*	Granite City, Ill.
		5.20 *C9*											Kokomo, Ind.
	4.35 *A7*		4.65 *A7*	5.20 *A7*									Middletown, Ohio
3.25 *N3* 3.00 *S1*		6.00 *N3*		6.00 *N3*	5.40 *S1*								Niles, Ohio Sharon, Pa.
3.60 *U1, J3,A7* 3.75 *A3*	4.35 *U1, J3,A7*	4.80 *U1*	4.65 *U1*		5.40 *U1,J3*	6.55 *U1,J3*	7.20 *U1*		4.10 *A5* 4.41 *P6*	$8.45 *U1,J3*	$7.15 *U1,J3*	5.85 *U1*	Pittsburgh, Pa.
									4.30 *P7*				Portsmouth, Ohio
3.60 *W3,W5*	5.35 *F3* 4.35 *W3,W5*	4.80 *W3,W5*		5.20 *W3,W5*	5.75 *W3*	6.90 *W3*				$8.45 *W3,W5*	$7.15 *W3,W5*	6.15 *W5* 5.85 *F3*	Weirton, Wheeling, Follansbee, W. Va.
3.60 *U1, R3,Y1*	4.35 *R3, Y1*	5.50 *R1*	4.65 *Y1*	6.05 *E2*	5.40 *U1,R3* 5.90 *Y1*	6.55 *R3* 7.05 *Y1*		6.05 *R1,E2*	4.10 *Y1*	$8.45 *R3*	$7.15 *R3*		Youngstown, Ohio
3.55 *K1*	5.30 *K1*				6.35 *K1*	7.50 *K1*			4.90 *K1*				Fontana, Cal.
3.90 *C7*													Geneva, Utah
													Kansas City, Mo.
3.30 *C7*		5.55 *C7*						5.40 *C7*	4.90 *B2,C7*	$9.20 *C7*	$7.90 *C7*		Los Angeles, Cal.
									4.35 *C6*				Minnequa, Colo.
3.30 *C7*	5.30 *C7*	5.55 *C7*											San Francisco, Cal. Niles, Cal.
													Seattle, Wash.
													Atlanta, Ga.
3.60 *R3,T2*	4.35 *T2*	4.80 *R3,T2*			5.40 *T2*			4.75 *R3*	4.10 *R3,T2*	$8.55 *T2*	$7.25 *T2*		Birmingham, Ala. Alabama City, Ala.
									4.50 *S2*				Houston, Texas

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfg'rs. Bright
EAST	Bethlehem, Pa.				4.30 *B3*	5.40 *B3*	5.55 *B3*					
	Buffalo, N. Y.	3.70 *B3,R3*	3.70 *B3,R3*	4.60 *B5*	4.30 *B3,R3*	5.40 *B3*	5.55 *B3*	3.70 *B3*				4.85 *W6*
	Claymont, Del.							4.15 *C4*		4.85 *C4*		
	Coatesville, Pa.							4.15 *L4*		5.25 *L4*		
	Conshohocken, Pa.							4.15 *A2*	4.75 *A2*	5.05 *A2*	5.90 *A2*	
	Harrisburg, Pa.							6.30 *C3*	6.30 *C3*			
	Hartford, Conn.			5.10 *R3*		5.85 *R3*						
	Johnstown, Pa.	3.70 *B3*	3.70 *B3*		4.30 *B3*		5.55 *B3*	3.70 *B3*		4.75 *B3*	5.65 *B3*	4.85 *B3*
	Newark, N. J.			5.00 *W10*		5.75 *W10*						
	New Haven, Conn.											
	Phoenixville, Pa.											
	Putnam, Conn.			5.10 *W10*								
	Sparrows Point, Md.		3.70 *B3*					3.70 *B3*		4.75 *B3*	5.65 *B3*	4.85 *B3*
	Worcester, Mass.					5.75 *A5*						5.15 *A5,W6*
	Trenton, N. J.											
MIDDLE WEST	Alton, Ill.	4.15 *L1*										5.05 *L1*
	Ashland, Ky.							3.70 *A7*				
	Canton-Massillon	3.70 *R3*		4.55 *R3,R2*	3.95 *T5* 4.30 *R3*	4.90 *T5* 5.40 *R3,R2*						
	Chicago, Ill.	3.70 *U1, R3, W8*	3.70 *R3*	4.55 *A5,B5, W8,W1*	4.30 *U1,R3 W8*	5.40 *R3,W8 W10,B5,L2* 5.45 *A5*		3.70 *U1,W8*	4.75 *U1*	4.75 *U1*	5.65 *U1*	5.10 *W7* 4.85 *R3,A5, K2,N4*
	Cleveland, Ohio	3.70 *R3*	3.70 *R3*	4.55 *A5,C13*		5.45 *A5*	5.55 *R3,J3*	3.70 *R3,J3*	4.75 *J3*		5.65 *R3,J3*	4.85 *A5,C13*
	Detroit, Mich.	3.85 *R5*		4.70 *P8,R5* 4.80 *P3*	4.45 *R5* 4.65 *G3*	5.50 *R5* 5.55 *P8* 5.60 *P3*						
	Duluth, Minn.											4.85 *A5*
	Gary Ind. Harbor Indiana	3.70 *U1, Y1, I3*	3.70 *U1,I3, Y1*	4.55 *R3,M5, L2*	4.30 *U1,I3, Y1*	5.40 *R3,M5, L2*	5.55 *U1,I3* 6.05 *Y1*	3.70 *U1,I3, Y1*	4.75 *I3*	4.75 *U1*	5.65 *U1,I3* 6.15 *Y1*	5.10 *M4*
	Granite City, Ill.							4.40 *G2*				
	Kokomo, Ind.											4.95 *C9*
	Middletown, Ohio											
	Niles, Ohio Sharon, Pa.							3.95 *S1*		5.20 *S1*	5.70 *S1*	
	Pittsburgh, Pa.	3.70 *U1,J3*	3.70 *U1,J3*	4.55 *R3,A5, J3,S8,W10, C8*	4.30 *U1,C11*	5.40 *C11,S8, W10,C8,A5*	5.55 *U1,J3*	3.70 *U1,J3*	4.75 *U1*	4.75 *U1*	5.65 *U1,J3*	4.85 *A5,J3* 5.25 *P6*
	Portsmouth, Ohio											5.25 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	3.85 *W3*						4.00 *W3,W5*				
	Youngstown, Ohio	3.70 *U1,R3, Y1*	3.70 *U1,R3, Y1*	4.55 *Y1,F2*	4.30 *U1, Y1, C10*	5.40 *Y1,C10, F2*	5.55 *U1* 6.05 *Y1*	3.70 *U1,R3, Y1*			5.65 *R3* 6.15 *Y1*	4.85 *Y1*
WEST	Fontana, Cal.	4.40 *K1*	4.40 *K1*		5.35 *K1*		6.60 *K1*	4.30 *K1*		5.70 *K1*	6.25 *K1*	
	Geneva, Utah							3.70 *C7*			5.65 *C7*	
	Kansas City, Mo.	4.30 *S2*	4.30 *S2*		4.90 *S2*							5.45 *S2*
	Los Angeles, Cal.	4.40 *C7,B2*	4.40 *C7,B2*		5.35 *B2*		6.25 *B2*					5.80 *C7,B2*
	Minnequa, Colo.	4.15 *C6*	4.50 *C6*					4.50 *C6*				5.10 *C6*
	San Francisco, Cal. Niles, Cal.	4.45 *B2* 4.40 *C7* 4.65 *P9*	4.45 *B2* 4.40 *C7* 4.65 *P9*				6.30 *B2*					5.90 *C7*
	Seattle, Wash.	4.45 *B2*	4.45 *B2*				6.30 *B2*	4.60 *B2*			6.55 *B2*	
SOUTH	Atlanta, Ga.	4.25 *A8*	4.25 *A8*									5.10 *A8*
	Birmingham, Ala. Alabama City, Ala.	3.70 *R3,T2*	3.70 *R3,T2*				5.55 *T2*	3.70 *R3,T2*			5.65 *T2*	4.85 *R3,T2*
	Houston, Tex.	4.10 *S2*	4.10 *S2*		4.70 *S2*			4.10 *S2*				5.25 *S2*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.
B1 Babcock & Wilcox Tube Co., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin Inc., Harvey, Ill.
C1 California Cold Rolled Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Steel Corp., Claymont, Del.
C5 Cold Metal Products Co., Youngstown
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia-Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Glassport, Pa.
C11 Crucible Steel Co. of America, New York
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.
F1 Firth Sterling Steel & Carbide Corp., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.
G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
H1 Hanna Furnace Corp., Detroit
I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland
J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
K1 Kaiser Corp., Oakland, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.
M1 Mahoning Valley Steel Co., Niles, O.
M2 McLauth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Co., Inc., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
N1 National Supply Co., Pittsburgh
N2 National Tube Co., Pittsburgh
N3 Niles Rolling Mills Co., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
O1 Oliver Iron & Steel Co., Pittsburgh
P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co. (John A.), Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw & Steel Co., Fitchburg, Mass.
S5 Sloss Sheffield Steel & Iron Co., Birmingham
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Sweet's Steel Co., Williamsport, Pa.
T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal, Iron & R. R. Co., Birmingham
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Steel Co., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
U1 United States Steel Co., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Co., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
Y1 Youngstown Sheet & Tube Co., Youngstown

Steel Prices

Base price, f.o.b., dollars per 100 lb.

WAREHOUSES — Cities	Delivery Charge*	Sheets: Hot-Rolled	Sheets: Cold-Rolled (15 gage)	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: Hot-Rolled A 4615 As rolled	Alloy Bars: Hot-Rolled A 4140 Annealed	Alloy Bars: Cold-Drawn A 4615 As Rolled	Alloy Bars: Cold-Drawn A 4140 Annealed
Baltimore	$.20	5.54–6.44	6.80–7.05	8.20	6.03	.....	6.13	6.13	6.01	6.63	.....	.....	.....	.....
Birmingham	.15	5.59	6.37	7.20–7.35[3]	5.54	.....	5.85	5.70	5.52	7.60	.....	.....	.....	.....
Boston	.20	6.25	7.03	8.33–8.59	6.15–6.20	7.74–8.70	6.38–6.63	6.20–6.25	6.05–6.14	6.61–6.92	10.25–10.30	10.55–10.63	11.95	12.15–12.28
Buffalo	.20	5.50–5.54	6.28–6.32	8.11–8.20	5.86–	.....	5.89–5.98	5.80–5.82	5.52–5.55	6.18–6.45	10.15	10.45–10.52	11.80	12.10–12.17
Chicago	.20	5.54	6.32	7.70	5.49	.....	5.65–5.70	5.65	5.47	6.05–6.30	.....	10.10	.....	11.75
Cincinnati	.15	5.87	6.39	8.17	5.79	.....	6.17	6.12	5.77	6.66	.....	10.52	.....	12.22
Cleveland	.20	5.52–5.54	6.32	7.83–7.96	5.65–5.88	.....	5.82–5.83	5.95–6.16	5.54–5.61	6.15–6.40	.....	10.21	.....	11.86
Detroit	.20	5 73–5.74	6.49	8.19–8.34	5.78	.....	6.04–6.17	6.12	5.76	6.60	.....	10.37	.....	12.12
Houston	.20	6.35–6.58	7.37–8.09	8.57	6.15	.....	6.39–6.42	6.32–6.35	6.38	8.38–8.63	10.95	11.12–11.25	11.40	12.62–12.90
Indianapolis	del'd.	5.94	6.72	8.25	5.89	.....	6.10	6.05	5.87	6.80	.....	10.50	.....	.....
Kansas City	.20	6.22–6.40	7.64–7.68	8.66–8.70	6.10–6.90	7.81	6.38–6.74	6.43–6.48	6.20–6.77	7.01–7.22	10.00	10.10	11.50	11.80
Los Angeles	.20	6.30	8.10–8.45	9.30–9.35	6.40	10.45	6.30	6.30	6.25–6.35	8.15	11.30	11.30	13.05	13.50
Memphis	.10	6.25	7.03	7.51	6.20	.....	6.36	6.36–6.61	6.33–6.57	7.11	.....	.....	.....	.....
Milwaukee	.20	5.71	6.48	7.87	5.66	.....	5.81–5.87	5.82	5.64	6.31–6.61	.....	10.17	.....	.....
New Orleans	.15	5.98	7.01	8.26	5.93	.....	6.09	6.09	5.91	7.02	.....	.....	.....	.....
New York	.30	6.09–6.52	6.90–6.91	8.12–8.45	6.36–7.19	7.67	6.46–6.88	6.08–6.40	6.22–6.42	7.03–7.13	10.45	10.49–10.75	12.10	12.14–12.40
Norfolk	.20	6.68	.....	.....	6.33	.....	6.20	6.20	5.95	7.30	.....	.....	.....	.....
Philadelphia	.25	5.84–6.07	6.80–7.22	8.00–8.38	6.04–6.08	7.15	6.05–6.19	5.86–6.09	6.14–6.27	6.96–7.16	9.82–10.17	10.24–10.47	11.82	11.89–12.12
Pittsburgh	.20	5.54	6.32	7.85–8.10	5.59–5.84	.....	5.65–5.70	5.65	5.47	6.15–6.40	.....	10.10	.....	11.75
Portland	.20	7.25	8.64	9.10–9.25	7.30	.....	6.80	7.19	7.00	8.65	.....	.....	.....	.....
Salt Lake City	.20	7.95	9.00	9.80–10.35	8.00	.....	7.45	7.60	7.95	.....	.....	.....	.....	.....
San Francisco	.15	6.51–6.65	7.88–8.23	9.10	6.42	10.45	6.40–6.43	6.30	6.32–6.34	8.15–8.20	11.30	11.30	13.05	13.50
Seattle	.20	6.14–6.81	8.38–8.44	8.93	7.05–7.75	.....	6.71–6.90	6.32–6.57	6.50–6.80	8.89–8.93	.....	.....	.....	.....
St. Louis	.20	5.73–5.84	6.62–7.15	8.00	5.77–5.79	7.66–8.15	6.02–6.10	6.05–6.22	5.77–5.80	6.43–6.70	10.08	10.40	11.73	12.05
St. Paul	.15	6.14	6.92	8.45	6.09	.....	6.25	6.25	6.07	6.75	.....	.....	.....	.....

* Metropolitan area delivery.

BASE QUANTITIES (Standard unless otherwise keyed): Cold finished bars; 2000 lb or over. Alloy bars; 1000 to 1999 lb. All others; 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets, for quantity.
EXCEPTIONS: (1) 500 to 1499 lb.

STAINLESS STEELS

Base price, cents per lb, f.o.b. mill.

Product	301	302	303	304	316	321	347	410	416	430
Ingots, rerolling	14.25	15.25	16.75	16.25	24.75	20.00	21.75	12.75	14.75	13.00
Slabs, billets, rerolling	18.50	20.00	22.00	21.00	32.25	26.25	28.50	16.50	20.00	16.75
Forg. discs, die blocks, rings	34.00	34.25	36.75	35.75	53.00	40.25	44.75	28.00	28.50	28.50
Billets, forging	26.25	26.50	28.50	27.75	41.50	31.25	35.00	21.50	22.00	22.00
Bars, wires, structurals	31.25	31.50	34.00	33.00	49.25	37.00	41.50	25.75	26.25	26.25
Plates	33.00	33.25	35.25	35.25	52.00	40.75	45.25	27.00	27.50	27.50
Sheets	41.00	41.25	43.25	43.25	57.00	49.25	53.75	36.50	37.00	39.00
Strip, hot-rolled	26.50	28.25	32.50	30.25	48.75	37.00	41.25	23.50	30.25	24.00
Strip, cold-rolled	34.00	36.75	40.25	38.75	59.00	48.25	52.25	30.50	37.00	31.00

STAINLESS STEEL PRODUCING POINTS—*Sheets*: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; McKeesport, Pa., *U1*; Washington, Pa., *W2*; (type 316 add 4.5¢) *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Ft. Wayne, *J4*; Lockport, N. Y., *R4*.

Strip: Midland, Pa., *C11*; Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; (type 316 add 4.5¢); W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Middletown, O., *A7*; Harrison, N. J., *D3*; Youngstown, *C5*; Lockport, N. Y., *S4*; Sharon, Pa., *S1* (type 301 add ½¢); Butler, Pa., *A7*; Wallingford, Conn., *W1*.

Bars: Baltimore, *A7*; Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Lockport, N. Y., *S4*; Canton, O., *T5*; Ft. Wayne, *J4*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*.

Plates: Brackenridge, Pa., *A3* (type 416 add ½¢); Butler, Pa., *A7*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Lockport, N. Y., *S4*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*.

Forged discs, die blocks, rings: Pittsburgh, *C11*; Syracuse, *C11*; Ferndale, Mich., *A3*; Washington, Pa., *J2*.

Forging billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*.

ALLEGHENY LUDLUM—Slightly higher on Type 301; slightly lower on others in 300 series.
WASHINGTON STEEL—Slightly lower on 300 series except where noted.

PIPE AND TUBING

Base discounts, f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS					
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½-3 In.		3½-4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
STANDARD T. & C.																				
Sparrows Pt. *B3*	34.0	12.0	37.0	16.0	39.0	19.5	40.0	20.0	40.5	21.0	41.0	21.5	41.5	22.0	....	....	....	....	....	....
Youngstown *R3*	36.0	14.0	39.0	18.0	41.5	21.5	42.5	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Oakland *K1*	25.0	3.0	28.0	7.0	30.5	10.5	31.0	11.0	31.5	12.0	32.0	12.5	32.5	13.0	....	....	....	....	....	....
Pittsburgh *J3*	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.5	8.0	32.5	11.5	34.5	13.5
Pittsburgh *N2*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
Alton, Ill. *L1*	35.0	13.0	38.0	17.0	40.5	20.5	41.0	21.0	41.5	22.0	42.0	22.5	42.5	23.0	....	....	....	....	....	....
Sharon *M3*	36.0	13.0	39.0	17.0	41.5	20.0	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.0	....	....	....	....	....	....
Pittsburgh *N1*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	....	32.5	....	34.5	....
Wheeling *W5*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	....	....	....	....	....	....
Wheatland *W4*	36.0	14.0	39.0	17.0	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown *Y1*	36.0	14.0	39.0	18.0	41.5	21.5	42.0	22.0	42.5	23.0	43.0	23.5	43.5	24.0	29.5	9.5	32.5	12.5	34.5	14.5
Indiana Harbor *Y1*	35.0	13.0	38.0	17.0	40.5	20.5	41.0	21.0	41.5	22.0	42.0	22.5	42.5	23.0	....	....	....	....	....	....
EXTRA STRONG PLAIN ENDS																				
Sparrows Pt. *B3*	33.5	13.0	37.5	17.0	39.5	20.5	40.0	21.0	40.5	22.0	41.0	22.5	41.5	23.0	....	....	....	....	....	....
Youngstown *R3*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Oakland *K1*	24.5	4.0	28.5	8.0	30.5	11.5	31.0	12.0	31.5	13.0	32.0	13.5	32.5	14.0	....	....	....	....	....	....
Pittsburgh *J3*	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	29.0	7.5	33.0	12.0	36.5	15.5
Pittsburgh *N2*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	10.0	33.0	14.0	36.5	17.5
Alton, Ill. *L1*	32.5	12.0	36.5	16.0	38.5	19.5	39.0	20.0	39.5	21.0	40.0	21.5	40.5	22.0	....	....	....	....	....	....
Sharon *M3*	35.5	14.0	39.5	18.0	41.5	21.0	42.0	21.5	42.5	22.0	43.0	22.5	43.5	23.0	....	....	....	....	....	....
Pittsburgh *N1*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	29.0	....	33.0	....	36.5	....
Wheeling *W5*	35.5	15.0	39.5	19.0	41.5	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	25.0	....	....	....	....	....	....
Wheatland *W4*	35.5	13.5	39.5	17.5	41.5	19.5	42.0	20.5	42.5	21.0	43.0	21.5	43.5	22.5	....	....	....	....	....	....
Youngstown *Y1*	35.5	15.0	39.5	19.0	41.0	22.5	42.0	23.0	42.5	24.0	43.0	24.5	43.5	26.0	29.0	10.0	33.0	14.0	36.5	17.5
Indiana Harbor *Y1*	34.5	14.0	38.5	18.0	40.5	21.0	41.0	22.0	41.5	23.0	42.0	23.5	42.5	24.0	....	....	....	....	....	....

Galvanized discounts based on zinc, at 17¢ per lb, East St. Louis. For each 1¢ change in zinc, discounts vary as follows: ½ in., ¾ in., and 1 in., 1 pt.; 1¼ in., 1½ in., 2 in., ¾ pt.; 2½ in., 3 in., ½ pt. Calculate discounts on even cents per lb of zinc, i.e., if zinc is 16.51¢ or 17.50¢ per lb, use 17¢. Jones & Laughlin discounts apply only when zinc price changes 1¢.

Threads only, buttweld and seamless, 1 pt. higher discount. Plain ends, buttweld and seamless, 3 in. and under, 3½ pts. higher discount. Buttweld jobbers' discount, 5 pct. East St. Louis zinc price now 15.0¢.

COKE

Furnace, beehive (f.o.b. oven)	Net-Ton
Connellsville, Pa.	$14.50 to $15.00
Foundry, beehive (f.o.b. oven)	
Connellsville, Pa.	$17.50 to $18.00
Foundry, oven coke	
Buffalo, del'd	$26.58
Chicago, f.o.b.	23.00
Detroit, f.o.b.	24.00
New England, del'd	24.80
Seaboard, N. J., f.o.b.	22.75
Philadelphia, f.o.b.	22.70
Swedeland, Pa., f.o.b.	22.60
Painesville, Ohio, f.o.b.	24.00
Erie, Pa., f.o.b.	23.50
Cleveland, del'd	25.72
Cincinnati, del'd	25.06
St. Paul, f.o.b.	22.50
St. Louis	25.40
Birmingham, del'd	21.69
Neville Island	23.00

ELECTRICAL SHEETS

22 Ga. H-R cut length F.o.b. Mill Cents Per Lb.	Armature	Elec.	Motor	Dynamo	Transf. 72	Transf. 65	Transf. 58
Beech Bottom *W5*	....	7.25	8.50	9.30	9.85	10.40	11.10
Brackenridge *A3*	....	7.25	8.50	9.30	9.85	....	....
Granite City *G2*	....	7.95	9.20	....	....	....	....
Ind. Harbor *I3*	6.75	7.25	....	....	....	....	....
Mansfield *E2*	7.25	7.75	9.00	9.80	....	....	....
Niles, O. *N3*	7.05	7.55	....	....	....	....	....
Vandergrift *U1*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Warren, O. *R3*	6.75	7.25	8.50	9.30	9.85	10.40	11.10
Zanesville *A7*	6.75	7.25	8.50	9.30	9.85	10.40	11.10

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges

Producing Point	Basic	Foundry	Malleable	Bessemer	Low Phos.	Bl. Furnace Silvery	Low Phos. Charcoal
Bethlehem *B3*	54.00	54.50	55.00	55.50	....	....	....
Birmingham *R3*	48.38	48.88	....	....	....	....	....
Birmingham *W9*	48.38	48.88	....	....	....	....	....
Birmingham *S5*	48.38	48.88	....	....	....	....	....
Buffalo *R3*	52.00	52.50	53.00	....	....	....	....
Buffalo *H1*	52.00	52.50	53.00	....	....	63.75	....
Chicago *I4*	52.00	52.50	52.50	53.00	....	....	....
Cleveland *A5*	52.00	52.50	52.50	53.00	57.00	....	....
Cleveland *R3*	52.00	52.50	52.50	....	....	....	....
Daingerfield, Tex. *L3*	48.00	48.50	48.50	....	....	....	....
Duluth *I4*	52.00	52.50	52.50	53.00	....	....	....
Erie *I4*	52.00	52.50	52.50	53.00	....	....	....
Everett, Mass. *M6*	....	59.75	60.25	....	....	....	....
Fontana *K1*	58.00	58.50	....	....	....	....	....
Geneva, Utah *U1, Y1*	52.00	52.50	52.50	53.00	....	....	....
Granite City, Ill. *K3*	53.90	54.40	54.90	....	....	....	....
Hubbard, Ohio *Y1*	52.00	52.50	52.50	....	....	....	....
Ironton, Utah *C7*	52.00	52.50	....	....	....	....	....
Jackson, Ohio *J1, G1*	....	....	....	....	....	62.50	....
Lyle, Tenn. *T3*	....	....	....	....	....	....	66.00
Monessen *P6*	54.00	....	....	....	....	....	....
Neville Island *P4*	52.00	52.50	52.50	53.00	....	....	....
Pittsburgh *U1*	52.00	....	....	53.00	....	....	....
Sharpsville *S3*	52.00	52.50	52.50	53.00	....	....	....
Steelton *B3*	54.00	54.50	55.00	55.50	60.00	....	....
Swedeland *A2*	56.00	56.50	57.00	57.50	....	....	....
Toledo *I4*	52.00	52.50	52.50	53.00	....	....	....
Troy, N. Y. *R3*	54.00	54.50	55.00	....	60.00	....	....
Youngstown *Y1*	52.00	52.50	52.50	53.00	....	....	....
N. Tonawanda, N. Y. *T1*	....	52.50	53.00	....	....	....	....

DIFFERENTIALS: Add 50¢ per ton for each 0.25 pct silicon over base, (1.75 to 2.25 pct, except low phos., 1.75 to 2.00 pct), 50¢ per ton for each 0.50 pct manganese over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel. Subtract 38¢ per ton for phosphorus, content 0.70 pct and over. Silvery Iron: Add $1.50 per net ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. $1 per ton for 0.75 pct or more phosphorus, manganese as above. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	22.67	26.66	21.99	25.86
	2½	12	30.48	35.84	29.57	34.76
	3	12	33.90	39.90	32.89	38.70
	3½	11	42.37	49.89	41.10	48.39
	4	10	52.60	61.88	51.03	60.02
National Tube	2	13	21.62	26.48	....	....
	2½	12	29.65	36.32	....	....
	3	12	34.00	41.64	....	....
	3½	11	40.34	49.41	....	....
	4	10	51.21	62.72	....	....
Pittsburgh Steel	2	13	....	27.08	....	....
	2½	12	30.40	37.13	....	....
	3	12	34.95	42.56	....	....
	3½	11	41.48	50.54	....	....
	4	10	52.65	64.16	....	....

CAST IRON WATER PIPE

	Per Net Ton
6 to 24-in., del'd Chicago	$105.30 to $108.80
6 to 24-in., del'd N.Y.	108.50 to 109.50
6 to 24-in., Birmingham	91.50 to 96.00
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipments; rail and water shipment less	$123.00 to $130.00

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

C-R SPRING STEEL

Cents Per Lb. F.o.b. Mill	CARBON CONTENT 0.26-0.40	0.41-0.60	0.61-0.80	0.81-1.05	1.06-1.35
Bridgeport, Conn. *S7*	5.35	6.80	7.40	9.35	11.65
Carnegie, Pa. *S9*	....	6.80	7.40	9.35	11.65
Cleveland *A5*	4.65	6.45	7.40	9.35	11.65
Detroit *D1*	5.60	6.65	7.25	....	....
New Castle, Pa. *B4*	5.35	6.80	7.40	9.35	....
New Haven, Conn. *D1*	5.85	6.75	7.35	....	....
Sharon, Pa. *S1*	5.35	6.80	7.40	9.35	11.65
Weirton, W. Va. *W3*	5.35	6.80	7.40	9.35	11.65
Worcester, Mass. *A5*	4.95	6.75	7.70	9.65	11.95
Youngstown *C5*	....	6.80	7.40	9.35	11.65

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Base Col.	Woven Wire Fence 9-15½ ga. Base Col.	Fence Posts Base Col.	Single Loop Bale Ties Base Col.	Twisted Barbless Wire Base Col.	Galv. Barbed Wire Base Col.	Merch. Wire Ann'ld ¢/lb.	Merch. Wire* Galv. ¢/lb.
Alabama City *R3*	118	126	....	123	....	136	5.70	5.95
Aliquippa, Pa. *J3*	118	132	....	....	136	140	5.70	6.15
Atlanta *A8*	121	133	....	126	126	143	5.95	6.40
Bartonville *K2*	118	130	....	123	143	143	5.70	6.15
Buffalo *W6*	....	....	....	....	....	....	6.85	....
Cleveland *A6*	125	....	....	....	....	....	....	....
Cleveland *A5*	....	....	....	....	....	....	5.70	6.10
Crawfrdsvl. *M4*	....	132	....	....	....	145	5.95	6.40
Donora, Pa. *A5*	118	130	....	123	140	140	5.70	6.15
Duluth *A5*	118	130	....	123	140	140	5.70	6.15
Fairfield, Ala. *T2*	118	130	....	123	....	140	5.70	6.15
Houston *S2*	126	138	....	....	....	148	6.10	6.55
Johnstn., Pa. *B3*	118	130	....	....	140	....	5.70	6.15
Joliet, Ill. *A5*	118	130	....	123	....	140	5.70	6.15
Kokomo, Ind. *C9*	120	132	....	125	138	142	5.80	6.05
Los Angeles *B2*	....	....	....	....	....	....	6.65	....
Kansas City *S2*	130	....	....	135	....	152	6.30	6.75
Minnequa *C6*	123	138	130	128	146	146	5.95	6.45
Monessen *P6*	124	135	....	....	....	145	5.95	6.40
Moline, Ill. *R3*	....	....	136	....	....	....	....	....
Pittsburg, Cal. *C7*	137	....	....	147	156	160	6.65	6.80
Portsmouth *P7*	124	137	....	....	147	147	6.10	6.60
Rankin, Pa. *A5*	118	130	....	....	140	140	5.70	6.15
So. Chicago *R3*	118	126	140	123	....	136	5.70	5.95
S. San Fran. *C6*	....	....	....	147	....	160	6.65	7.10
Sparrows Pt. *B3*	120	....	....	125	142	142	5.80	6.25
Sterling, Ill. *N4*	118	130	....	123	140	140	5.70	6.15
Struthers, O. *Y1*	....	....	....	....	....	....	5.70	6.15
Torrance, Cal. *C7*	138	....	....	....	....	....	6.65	....
Worcester *A5*	124	....	....	....	....	....	6.00	6.45
Williamsport, Pa. *S10*	....	....	150	....	....	....	....	....

Cut Nails, carloads, base $7.35 per 100 lb. (less 20¢ to jobbers), at Conshohocken, Pa., (*A2*), Wheeling, W. Va. (*W5*), $7.15.

* Alabama City and So. Chicago don't include zinc extra

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Axles	Screw Spikes	Tie Plates	Track Bolts Treated
Bessemer *U1*	3.60	4.00	4.70	....	....	....	....	....
Chicago *R3*	....	....	....	6.15	....	....	....	....
Cleveland *R3*	....	....	....	....	....	9.35	....	....
Ensley *T2*	3.60	4.00	....	....	....	....	....	....
Fairfield *T2*	....	4.00	4.70	6.15	5.60	....	4.50	9.80
Gary *U1*	3.60	4.00	....	....	....	....	4.50	....
Ind. Harbor *I3*	3.60	....	4.70	6.15	5.60	....	4.50	....
Johnstown *B3*	....	4.00	....	....	5.60	....	....	....
Joliet *U1*	....	4.00	4.70	....	....	....	....	....
Kansas City *S2*	....	....	....	6.40	....	....	....	9.85
Lackawanna *B3*	3.60	4.00	4.70	....	....	....	4.50	....
Lebanon *B3*	....	....	....	6.15	....	9.35	....	9.85
Minnequa *C6*	3.60	4.50	4.70	6.15	....	....	4.50	9.85
Pittsburgh *R3*	....	....	....	....	....	9.35	....	....
Pittsburgh *O1*	....	....	....	....	....	9.35	....	9.85
Pittsburgh *P5*	....	....	....	....	....	....	....	9.85
Pittsburgh *J3*	....	....	....	6.15	....	....	....	....
Pitt'g., Cal. *C7*	....	....	....	....	....	....	4.65	....
Seattle *B2*	....	....	....	6.65	....	....	4.65	....
Steelton *B3*	3.60	....	4.70	....	....	....	4.50	....
Struthers *Y1*	....	....	....	6.15	....	....	....	....
Torrance *C7*	....	....	....	....	....	....	4.65	....
Youngstown *R3*	....	....	....	6.15	....	....	....	....

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	$1.505
18	4	1	—	5	$2.13
18	4	2	—	—	$1.66
1.5	4	1.5	8	—	81.0¢
6	4	2	6	—	96.5¢

High-carbon chromium ..... 63.5¢
Oil hardened manganese ..... 35¢
Special carbon ..... 32.5¢
Extra carbon ..... 27¢
Regular carbon ..... 23¢

Warehouse prices on and east of Mississippi are 3.5¢ per lb higher. West of Mississippi, 5.5¢ higher.

CLAD STEEL

Stainless-carbon	Plate	Sheet
No. 304, 20 pct.		
Coatesville, Pa. *L4*	*29.5	
Washington, Pa. *J2*	*29.5	
Claymont, Del. *C4*	*28.00	
Conshohocken, Pa. *A2*		*27.50
New Castle, Ind. *I2*	*29.77	*26.24
Nickel-carbon		
10 pct Coatesville, Pa. *L4*	32.5	*
Inconel-carbon		
10 pct Coatesville, Pa. *L4*	40.5	
Monel-carbon		
10 pct Coatesville, Pa. *L4*	33.5	
No. 302 Stainless-copper stainless, Carnegie, Pa. *A4*		77.00
Aluminized steel sheets, hot dip, Butler, Pa. *A7*		7.75

* Includes annealing and pickling, or sandblasting.

ELECTRODES

Cents per lb, f.o.b., plant threaded electrodes with nipples, unboxed

Diam. in in.	Length in in.	Cents Per lb.
	GRAPHITE	
17, 18, 20	60, 72	17.85
8 to 16	48, 60, 72	17.85
7	48, 60	19.57
6	48, 60	20.95
4, 5	40	21.50
3	40	22.61
2½	24, 30	23.15
2	24, 30	25.36
	CARBON	
40	100, 110	8.03
35	65, 110	8.03
20	65, 84, 110	8.03
24	72 to 104	8.03
17	84, 90	8.03
14	60, 72	8.03
10, 12	60, 72	8.57
8	60	8.84
	60	9.10

FLUORSPAR

Washed gravel, f.o.b. Rosiclaire, Ill. Price, net ton; Effective CaF_2 content:
70% or more $43.00
60% or less 40.00

BOLTS, NUTS, RIVETS, SCREWS

Consumer Prices

(Base, discount, f.o.b. mill, Pittsburgh, Cleveland, Birmingham or Chicago)

Nuts, Hot Pressed, Cold Punched—Sq.

Pct Off List

	Less Keg. Reg.	K.	Less Keg. Hvy.	K.
½ in. & smaller	15	28½	15	28½
9/16 in. & ⅝ in.	12	25	6½	21
¾ in. to 1½ in. inclusive	9	23	1	16½
1⅝ in. & larger	7½	22	1	16½

Nuts, Hot Pressed—Hexagon

½ in. & smaller	26	37	22	34
9/16 in. & ⅝ in.	16½	29½	6½	21
¾ in. to 1½ in. inclusive	12	25	2	17½
1⅝ in. & larger	8½	23	2	17½

Nuts, Cold Punched—Hexagon

½ in. & smaller	26	37	22	34
9/16 in. & ⅝ in.	23	35	17½	30½
¾ in. to 1½ in. inclusive	19½	31½	12	25
1⅝ in. & larger	8½	23	2	17½

Nuts, Semi-Finished—Hexagon

	Reg.		Hvy.	
½ in. & smaller	35	45	28½	29½
9/16 in. & ⅝ in.	23	35	17½	30½
¾ in. to 1½ in. inclusive	24	36	15	28½
1⅝ in. & larger	13	26	8½	23
	Light			
7/16 in. & smaller	35	45		
½ in. thus ⅝ in.	28½	39½		
¾ in. to 1½ in. inclusive	26	37		

Stove Bolts *Pct Off List*

Packaged, steel, plain finished. 48—10
Packaged, plate finish ..... 31—10
Bulk, plain finish** 62*

*Discounts apply to bulk shipments in not less than 15,000 pieces of a size and kind where length is 3-in. and shorter; 5000 pieces for lengths longer than 3-in. For lesser quantities, packaged price applies.

**Zinc, Parkerized, cadmium or nickel plated finishes add 6¢ per lb net. For black oil finish, add 2¢ per lb net.

Rivets *Base per 100 lb*

½ in. & larger $7.85

Cap and Set Screws

(In bulk) *Pct Off List*

Hexagon head cap screws, coarse or fine thread, ¼ in. thru ⅝ in. x 6 in., SAE 1020, bright	54
¾ in. thru 1 in. up to & including 6 in.	48
¼ in. thru ⅝ in. x 6 in. & shorter high C double heat treat	46
¾ in. thru 1 in. up to & including 6 in.	41
Milled studs	35
Flat head cap screws, listed sizes	16
Fillister head cap, listed sizes	34
Set screws, sq head, cup point, 1 in. diam. and smaller x 6 in. & shorter	53

Machine and Carriage Bolts

Pct Off List

	Less Case	C.
½ in. & smaller x 6 in. & shorter	15	28½
9/16 in. & ⅝ in. x 6 in. & shorter	18½	30½
¾ in. & larger x 6 in. & shorter	17½	29½
All diam. longer than 6 in.	14	27½
Lag, all diam. x 6 in. & shorter	23	35
Lag, all diam. longer than 6 in.	21	33
Plow bolts	34	....

REFRACTORIES

Fire Clay Brick

First quality, Ill., Ky., Md., Mo., Ohio, Pa. (except Salina, Pa., add $5)	$94.60
No. 1 Ohio	88.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	88.00
No. 2 Ohio	79.20
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	13.75

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$94.60
Childs, Pa.	99.00
Hays, Pa.	100.10
Chicago District	104.50
Western Utah and Calif.	111.10
Super Duty, Hays, Pa., Athens, Tex., Chicago	111.10
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	16.50
Silica cement, net ton, bulk, Hays, Pa.	18.70
Silica cement, net ton, bulk, Ensley, Ala.	17.60
Silica cement, net ton, bulk, Chicago District	17.60
Silica cement, net ton, bulk, Utah and Calif.	24.70

Chrome Brick *Per Net Ton*

Standard chemically bonded Balt, Chester $82.00

Magnesite Brick

Standard, Baltimore	$104.00
Chemically bonded, Baltimore	93.00

Grain Magnesite *St. ⅝-in. grains*

Domestic, f.o.b. Baltimore in bulk fines removed	$62.70
Domestic, f.o.b. Chewalah, Wash., in bulk	36.30
in sacks	41.80

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk Midwest, add 10¢; Missouri Valley, add 20¢ ... $13.75

LAKE SUPERIOR ORES

51.50% Fe; natural content, delivered lower Lake ports. 1952 prices not yet established. 1951 prices were:

Old range, bessemer	$8.70
Old range, nonbessemer	8.55
Mesabi, bessemer	8.45
Mesabi, nonbessemer	8.30
High phosphorus	8.30

After adjustments for analyses, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in Lake vessel rates, upper Lake rail freights, dock handling charges and taxes thereon.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.l.f. New York, ocean bags	7.4¢ to 9.0¢
Canadian sponge iron, del'd, in East	10.00¢
Domestic sponge iron, 98+% Fe, carload lots	15.5¢ to 17.0¢
Electrolytic iron, annealed, 99.5+% Fe	42.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	53.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 micron, 98%, 99.8+% Fe.	83.0¢ to $1.48
Aluminum	31.5¢
Brass, 10 ton lots	30.00¢ to 33.25¢
Copper, electrolytic	10.75¢ plus metal value
Copper, reduced	10.00¢ plus metal value
Cadmium, 100-199 lb	95¢ plus metal value
Chromium, electrolytic, 99% min., and quantity, del'd	$3.50
Lead	7.5¢ to 12.0¢ plus metal value
Manganese	57.0¢
Molybdenum, 99%	$2.75
Nickel, unannealed	88.0¢
Nickel, annealed	95.0¢
Nickel, spherical, unannealed	92.0¢
Silicon	38.5¢
Solder powder	7.0¢ to 9.0¢ plus met. value
Stainless steel, 302	83.00¢
Stainless steel, 316	$1.10
Tin	14.00¢ plus metal value
Tungsten, 99% (65 mesh)	$6.00
Zinc, 10 ton lots	23.0¢ to 30.5¢

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Fasten Fast with Clark Fasteners

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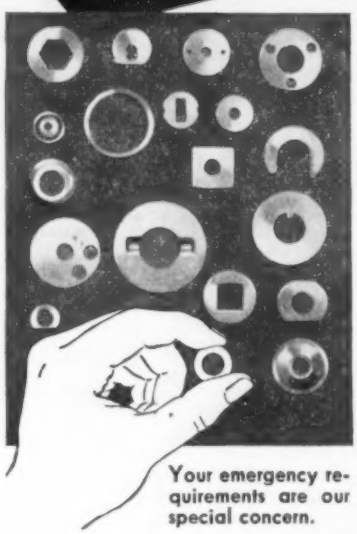
MILLDALE, CONN.

6-M-2c

BOLTS • NUTS • RIVETS • SCREWS

Standard ..Specials

STEEL WASHERS
FOR EVERY NEED



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Your requirements for standard and special steel washers are sure to be satisfied at Joliet. A bank containing thousands of special dies in many shapes and forms, 9/32″ to 8″ O.D., gauges No. 28 to 3/8″, stands ready to answer your needs. A VARIETY OF FINISHES IS AVAILABLE to meet your special needs, including: Electro-plating, Galvanizing, Parkerizing, and Cyanide hardening.

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JOLIET, ILLINOIS

JOLIET WROUGHT WASHER CO.

—Ferroalloy Prices—

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk in carloads delivered. (65-72% Cr, 2% max. Si.)

0.06% C	30.50	0.20% C	29.50
0.10% C	30.00	0.50% C	29.25
0.15% C	29.75	1.00% C	29.00
2.00% C			28.75
65-69% Cr, 4-9% C			32.00
62-66% Cr, 4-6% C, 6-9% Si			32.60

S. M. Ferrochrome

Contract price, cents per pound, chromium contained, lump size, delivered.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads	21.60
Ton lots	23.75
Less ton lots	25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads	27.75
Ton lots	30.05
Less ton lots	31.85

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.14
0.50% max. C.	1.10
9 to 11% C.	1.08

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-49%, C 0.05% max.) Contract price, carloads, f.o.b. Niagara Falls, freight allowed; lump 4-in. x down, bulk 2-in. x down, 21.75¢ per lb of contained Cr plus 12.40¢ per lb of contained Si.

Bulk 1-in. x down, 21.90¢ per lb contained Cr plus 12.60¢ per lb contained Si.

Calcium-Silicon

Contract price per lb of alloy, dump delivered.
30-33% Ca, 60-65% Si, 3.00% max. Fe.

Carloads	19.00
Ton lots	22.10
Less ton lots	23.60

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy lump, delivered.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	20.00
Ton lots	22.30
Less ton lots	23.30

CMSZ

Contract price, cents per lb of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50.56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-5.00% C.

Ton lots	20.75
Less ton lots	22.00

SMZ

Contract price, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots	17.50
Less ton lots	19.50

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots	16.50
Less ton lots	17.75

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.00
Ton lots to carload packed	19.00
Less ton lots	20.50

Ferromanganese

78-82% Mn, maximum contract base price, gross ton, lump size.

F.o.b. Niagara Falls, Alloy, W. Va., Ashtabula, O.	$185
F.o.b. Johnstown, Pa.	$187
F.o.b. Sheridan, Pa.	$185
F.o.b. Etna, Clairton, Pa.	$188

$2.00 for each 1% above 82% Mn, penalty, $2.15 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk	10.95
Ton lots	12.55

Ferroalloys

Continued

Spiegeleisen

Contract prices gross ton; lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$74.00	$75.00
Pbh. or Chicago	74.00	75.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
96% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, packed	34.75
Ton lots	36.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	28
Ton lots	30
Less ton lots	32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.7% max. C, 0.06% P, 90% Mn	26.25	28.10	29.30
0.07% max. C	25.75	27.60	28.80
0.15% max. C	25.25	27.10	28.30
0.30% max. C	24.75	26.60	27.80
0.50% max. C	24.25	26.10	27.30
0.75% max. C 7.00% max. Si	21.25	23.10	24.30

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

Carloads	9.90
Ton lots	11.30

Calcium molybdate, 46.3-46.6% f.o.b. Langeloth, Pa., per pound contained Mo $1.15

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn ..... 19.15¢

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.

Carload bulk	9.90
Ton lots	11.55
Briquet, contract basis carlots, bulk delivered, per lb of briquet	11.15
Ton lots	12.75

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $92.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $90.00. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50% Mn over 1%.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe	21.70
97% Si, 1% Fe	22.10

Silicon Briquets

Contract price, cents per pound of briquet bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	6.95
Ton lots	8.55

Electric Ferrosilicon

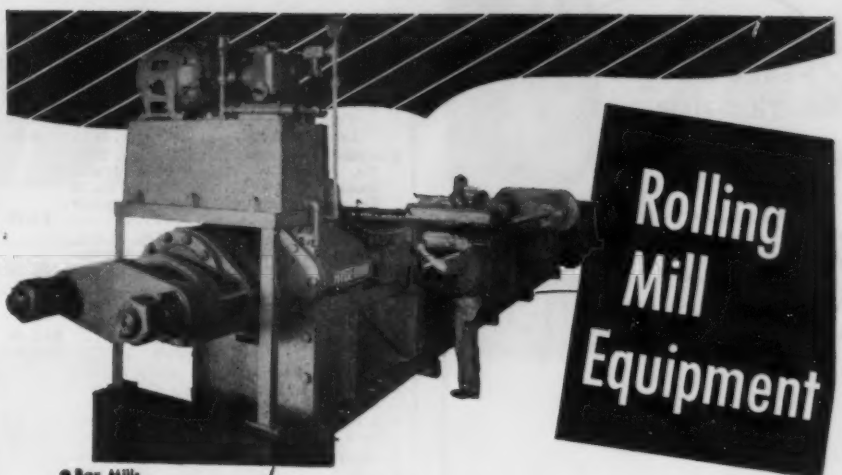
Contract price, cents per pound contained Si, lump, bulk, carloads, delivered.

25% Si	20.00	75% Si	14.30
50% Si	12.40	85% Si	15.55
90-95% Si			17.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55



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Other Ferroalloys

Ferrocolumbium, 50-60% 2 in. x D, contract basis, delivered, per pound contained Cb.
Ton lots $4.90
Less ton lots 4.95

Ferro-Tantalum-Columbium, 20% Ta, 40% Cb, 0.30 C. Contract basis, delivered, ton lots, 2 in. x D, per lb of contained Cb plus Ta $3.75

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo. $1.33

Ferrophosphorus, electrolytic, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton $65.00
10 tons to less carload $75.00

Ferrotitanium, 40%, regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.35

Ferrotitanium, 25%, low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti $1.50
Less ton lots 1.55

Ferrotitanium, 15 to 18%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload per net ton $177.00

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W5, ton lots, delivered $5.00

Ferrovanadium, 35-55% contract basis, delivered, per pound, contained V.
Openhearth ..... $3.00-$3.10
Crucible 3.10- 3.20
High speed steel (Primos) 3.20- 3.25

Molybdic oxide, briquets or cans, per lb contained Mo, f.o.b. Langeloth, Pa. $1.14
bags, f.o.b. Washington, Pa., Langeloth, Pa. $1.13

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound
Carload, bulk lump ..... 14.50¢
Ton lots, bulk lump ..... 15.75¢
Less ton lots, lump ..... 16.25¢

Vanadium Pentoxide, 86-89% V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.28

Zirconium, 35-40%, contract basis f.o.b. plant, freight allowed, per pound of alloy.
Ton lots ..... 21.00¢

Zirconium, 12-15%, contract basis, lump, delivered, per lb of alloy.
Carload, bulk ..... 7.00¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B, 3-4%, Si, 40-45%, per lb contained B.... $5.25

Bortam, f.o.b. Niagara Falls
Ton lots, per pound ..... 45¢
Les ton lots, per pound.... 50¢

Corbortam, Ti, 15-21%, B, 1-2%, Si, 3-4%, Al, 1-2%, C, 4.5-7.5%, f.o.b. Suspension Bridge, N. Y., freight allowed.
Ton lots, per pound ..... 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D. Ton lots.... $1.20
F.o.b. Wash., Pa.; 100 lb up
10 to 14% B ..... .85
14 to 19% B 1.20
19% min. B 1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.
No. 1 ..... $1.00
No. 6 ..... 68¢
No. 79 ..... 50¢

Manganese-Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd
Ton lots $1.46
Less ton lots 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.
Less ton lots $1.80

Silcaz, contract basis, delivered.
Ton lots ..... 45.00¢

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